Price One Dollar

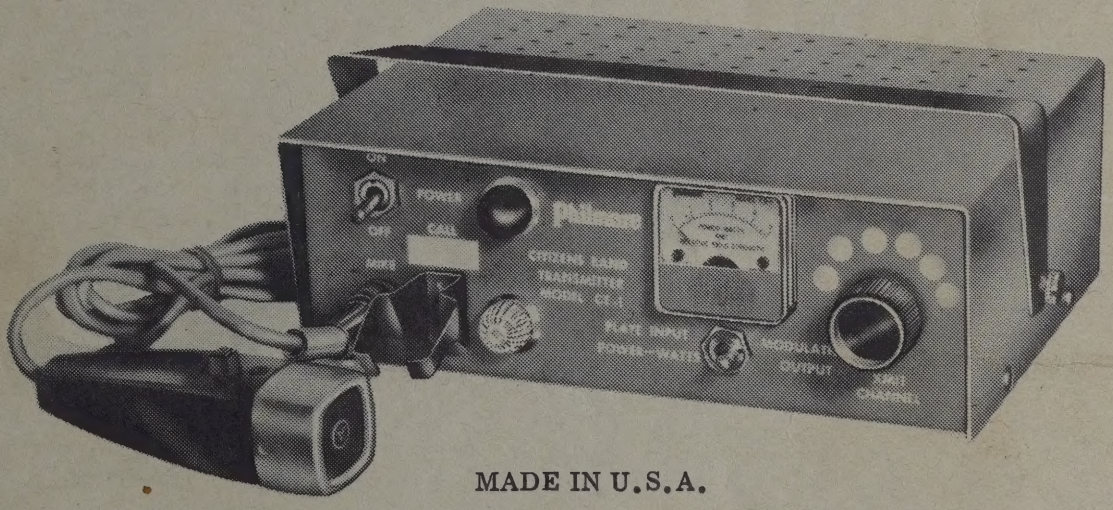
INSTRUCTION MANUAL

Philmore

Model CT-1

CITIZENS' BAND

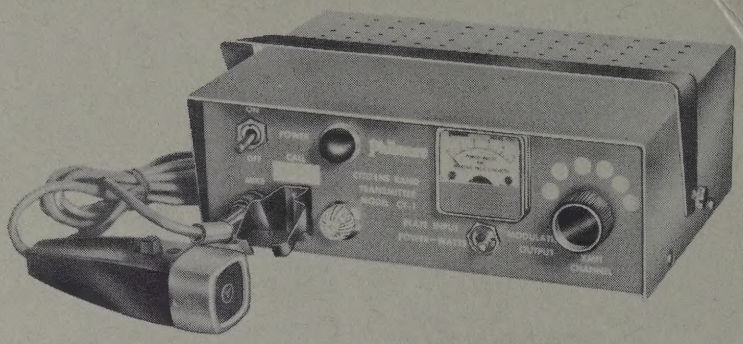
TRANSMITTER KIT



MADE IN U.S.A.

Like any other piece of electronic equipment, the ultimate performance of this kit depends upon three factors: the excellence of its initial engineering design, the quality of its components, and the care with which it is assembled. PHILMORE MANUFACTURING CO. is justly proud of the manner in which it has handled the first two; the remaining factor -- care in assembly -- is entirely in your hands. To insure the superb performance designed into the kit, PHILMORE provides you with one of the most comprehensive instruction manuals ever prepared for the kit builder. Each step has been tested thoroughly. For maximum ease of assembly and the final pleasurable thrill of building an instrument that works properly the first time it is powered, PHILMORE urges you to follow all instructions in the order given, without omissions or modifications.

PHILMORE MANUFACTURING CO., INC. • RICHMOND HILL 18, N.Y.



PHILMORE MODEL CT-1 TRANSMITTER

SOLDERING

In virtually all electronic equipment, good solder joints are depended upon to insure proper electrical connections. The cultivation of a few relatively simple techniques will enable you to solder expertly almost at once. By following instructions exactly, not only will you find soldering easy, but you will also experience the gratification of seeing a professional-looking instrument when you are through.

The Solder - Purchase a good grade of rosin-core solder. Under no conditions should acid-core solder be used! When asking for solder, specify a 60:40 alloy (60% tin, 40% lead). If this is not available in your locality, 50:50 solder may be used but is not quite as satisfactory since more heat is required to melt it. Do not use solder with a lower tin content than 50%. We must strongly emphasize that separate paste fluxes or liquid soldering aids must not be used. ALL GUARANTEES AND WARRANTEES ARE VOIDED IF ANY PHILMORE KIT OR COMPONENT IS RETURNED TO THE FACTORY BEARING EVIDENCE OF THE USE OF PASTE FLUXES, SOLDERING LIQUIDS, OR ACID-CORE SOLDER.

The Soldering Iron - Almost any good commerical soldering iron or soldering gun can do a good job in competent hands. We recommend an iron of not less than 60 watts nor more than 100 watts in power rating; the same is true of soldering guns. In either case, the working tip must be coated with a thin layer of solder before any joints are attempted. If your iron has never been used before, it should be coated (this is called tinning) as follows: plug the iron into a convenient 120 volt a-c outlet and let it warm for a minute or two. As it heats, keep rubbing a piece of rosin-core solder along one of the tip faces until the solder begins to melt. Tin each face of the tip (or the tip of the gun) until it is uniformly shiny and bright. While the tip is still hot, wipe it briskly with a cloth to remove excess solder.

As the iron is used, its tip should be brightened occasionally by a few rapid strokes on a pad of fine steel wool. Once the tip becomes corroded, it should be filed bright again -- right down to the copper -- and re-tinned for further use. Never dip the tip in cold water to cool it; always permit it to come back to room temperature at its own rate once the plug is removed. YOU CANNOT SOLDER PROPERLY WITH A CORRODED, PITTED, OR DIRTY TIP.

Soldering Technique - Anyone who has had little experience with soldering will find this order of procedure to result in excellent solder joints.

1. Be sure the terminal and wire are bright and clean and free of strands of insulation or wax. Rubbing with steel wool will insure this condition if you are in doubt.

2. Wrap or crimp the wire around the terminal using your long-nose pliers to be certain of good mechanical joining. Never depend upon solder alone for mechanical strength.

3. Bring the hot iron to the terminal and wire(s), applying a clean, flat face to the joint. Leave it there for at least three seconds to heat the joint, then with the iron still in place, apply the solder to both the iron tip and the work. USE SOLDER SPARINGLY! More poor joints are the result of using excessive amounts of solder than from any other single cause.

4. Let the solder RUN AND FLOW in and around the terminal and wire(s). This will avoid a lumpy, unreliable "cold" solder joint. You will recognize the time for removal of the iron when the solder appears "glassy" and smooth.

5. Allow the joint to cool, then wipe it clean with gentle strokes of a small piece of cloth.

6. Examine the joint. If it shows any evidence of cracked or grainy texture it is probably an indication of movement of the wire(s) before the joint was fully cool. Merely flow the solder back into the joint by reheating. Be sure that the solder has not run where you don't want it; often, hidden solder flows cause short-circuits or other undesirable connections that prevent the equipment from functioning correctly.

Some Additional Tips

*When soldering crystal diodes, transistors, or small carbon resistors, the pigtail of the component should be gripped close to the body with your long-nose pliers to held conduct the heat away from the sensitive portion of the part. Overheating transistors or diodes while soldering my result in destruction of the component; resistors have been known to change value by as much as 25% as a result of overheating while soldering.

*Avoid undue mechanical stress on the pigtails of small parts, as well as on the terminal lugs of sockets, coils, and switches.

*When soldering stranded wire to a terminal, tin the strands together before crimping around the terminal. This prevents loose, unseen strands from "floating" around where they may touch other metallic parts.

*When soldering to tube sockets, it is often helpful to plug a discarded tube into the socket to avoid having solder run into the socket holes.

*Use just enough heating time when working on coil terminals to give you a good joint. Overheating here may damage the winding adjacent to the terminal lug.

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SECTION I

SPECIFIC PRELIMINARY INFORMATION

Electrical and Mechanical Specifications of
the Model CT-1 Citizens Band Transmitter

R.F. SECTION

Power Input	Maximum of 5 watts total Anode (plate) circuit power input.
Frequency Coverage	Any SIX of the 22 authorized frequencies in the 11 meter (27 megacycles) Citizens Band can be switch selected from the panel. Channel 12 crystal (27.105 MC) provided for alignment purposes.
Frequency Control	Operating frequencies crystal controlled within .005% of marked crystal frequency over and ambient temperature range of - 20° F to + 130° F. Tolerance guaranteed only with crystals specifically ground for PHILMORE Model CT-1 (available at local dealer).
Output Network	Hi-Q pi output network, with air-padder input capacitor for maximum power transfer to load.
Output Impedance	Output trimmer matches loads from 30 to 75 ohms.
Harmonic Content	Use of full neutralization and pi output network keeps spurious harmonic content of output better than 60 db below output at 27 megacycles.
Modulation	Combined plate and screen modulated, AM, with automatic limiting to maximum of 100%. Fully meets requirements for Class D Citizens Band emission.
Metering	Dual function meter reads both actual plate input power and relative output and modulation. Output meter draws no power from actual output to antenna.

AUDIO SECTION:

Input	High impedence input from ceramic microphone, fully by-passed for RF feedback.
Amplification	Two high-gain triode stages, with bandwidth controlled to range of maximum speech intelligibility to minimize power loss in sidebands.
Output	Beam-power output delivers 2.5 watts modulation power into tapped choke (Heising) coupling to limit modulation to 100% maximum.

SWITCHING:

Power	Heavy duty power switch for control of accessory power supply.
Transmit-Receive	Push-to-talk switch on microphone operates relay in power supply to switch B plus and antenna into unit for TRANSMIT mode, removes both for RECEIVE mode.
Metering	Two position toggle switch for either PLATE INPUT POWER or OUTPUT-MODULATION functions of meter.
Output Channel	Six position selector switch for any crystals inserted in unit.

POWER REQUIREMENTS:

Mobile Operation	Designed to be used with Model CPM-1 Transistorized Mobile Power Supply on 12 Volt vehicle systems.
Fixed Station Operation	Designed to be used with Model CPA-1 A.C. Power Supply for 110-120 volt A.C., 50-60 cycles. Other supplies must provide 12 volts A.C. or D.C. filament current at 2 amps; 300 volts D.C. at 80 milliamps B plus.

ADDITIONAL FEATURES:

Bracket	Special design hanger bracket for mobile installation under any type of dashboard, swivels and locks for maximum accessibility. Can also be reversed and used as tilt table stand for fixed station use.
Cables	Shielded 5 foot power cable permanently attached to unit. 5 feet of RG-58/U, 52 ohm coaxial cable, with UHF connectors for connection to power supply antenna switch box.
Miscellaneous	All power cable conductors fully bypassed for minimum external radiation. Tubes fully shielded for minimum radiation and RF feedback. Microphone bracket mounted on panel for convenience. Panel indicator lights for POWER ON and TRANSMIT mode. Bracket holds crystals firmly in place in roughest mobile use. Lock shaft on output network capacitor to prevent change of output adjustment under vibration. Transmitter identification card and license application form provided. Adhesive number sheet to identify Call Numbers of set and transmitting channels used.

ACCESSORIES:

Antenna	Can be used with any commercially available Citizens Band antenna cut for 11 meters. Will power either the base-loaded , quarter-wave body mounted whip, conical (ground-plane), or beam type of antennas.

GENERAL SPECIFICATIONS:

Tube Compliment	6CX8 - Third overtone oscillator driver and R.F. power amplifier. 12AX7 - Microphone amplifier and driver 6AQ5 - Beam-power modulator IN34A - Output meter crystal diode detector.
Dimensions	3 inches high (less bracket) 8-1/2 inches wide (less bracket) 6 inches deep

CIRCUIT FEATURES AND OPERATION: (See schematic diagram on page 4).

The triode section of the 6CX8 tube is used as a crystal controlled oscillator. The circuit is a standard tuned-grid, tuned-plate configuration, which oscillates due to the internal grid-to-plate capacity. The frequency of oscillation is governed by the crystal in the grid circuit, and the plate tank circuit, consisting of the oscillator coil and the variable capacitor. Since the tube can oscillate on any harmonic of the basic frequency for which the crystal was cut, this plate tank is tuned to select the third harmonic of the crystal, which lies in the 11 meter Citizens Band. Any other harmonic frequency lies outside the tuning range of this circuit, thus excluding operation on any frequency other than those within the Citizens Band. This R.F. oscillation is fed into the grid of the pentode section of the 6CX8 tube, where power amplification takes place. A small value variable trimmer capacitor connected from the plate of the pentode amplifier to the B plus feed point of the oscillator (effective ground for R.F.) neutralizes any spurious parasitics generated in the power amplifier. Amplified R.F. power is fed to the antenna through the tuned pi output network. The air trimmer capacitor on the input leg of this network tunes the plate of the amplifier for maximum amplification at the desired frequency, and the large trimmer on the output leg matches the network impedance of the antenna for maximum power transfer.

Audio signals from the microphone are amplified in both stages of the 12AX7 tube, and coupled to the 6AQ5 tube, which acts as an audio frequency power amplifier. This tube modulates the B plus being fed to the R.F. power amplifier through the modulation choke. The plate load tap for the 6AQ5 on this choke is so positioned that automatic limiting to 100% modulation is assured through clipping of the audio signal output.

The filaments of the three tubes are wired in a series-parallel configuration, in order to utilize 6 volt tubes on the 12 volt supply. The current load is equalized in the tubes by use of the pilot lamp across the 6AQ5 filament. For this reason, the set should not be operated without the pilot lamp in place and operating. The transmit indicator lamp is a neon bulb, fired when B plus is applied to the unit from the push-to-talk relay in the power supply.

All cables in the unit from the power supply are bypassed at their first termination, to prevent R.F. radiation and feed-back into the audio stages. For this purpose also, a large barrier shield is placed between the audio and R.F. stages, and shields are used on all tubes. The microphone cable is also bypassed where it enters the cabinet so as to reduce audio feedback.

The meter performs two separate functions, as selected by the front panel switch. In the PLATE INPUT POWER position, the voltage drop across the wire-wound plate dropping resistor in the Power Amplifier is sampled, and the series calibrating resistor causes the 50 microampere movement to read full scale with exactly 5 watts of plate input power. The reading is automatically corrected to subtract screen power, and read only actual plate power. When switched to RELATIVE OUTPUT-MODULATION position, a tuned circuit, consisting of the meter pick-up coil and a trimmer capacitor, samples the R.F. field being radiated inside the cabinet. The signal appearing across this tuned circuit is rectified by the crystal diode, and fed through a current limiting resistor into the sensitive 50 microampere movement of the meter. Sensitivity can be set by the tuning of the trimmer capacitor. Relative modulation can be read as fluctuations in the meter due to the increase in output power as the signal is modulated.

THIS PHILMORE MODEL CT-1 TRANSMITTER HAS BEEN DESIGNED FOR USE IN CLASS "D" OPERATION IN THE 11 METER CITIZENS RADIO SERVICE. IT IS DESIGNED TO MEET THE FEDERAL COMMUNICATIONS COMMISSION REQUIREMENTS APPLICABLE TO EQUIPMENT OPERATING IN THIS SERVICE UNDER CLASS "D" EMISSION, AND IS NOT TO BE USED FOR OTHER TYPES OF EMISSION IN THIS SERVICE. SPECIFICATIONS REGARDING PLATE INPUT POWER AND FREQUENCY TOLERANCE ARE VALID ONLY IF THIS UNIT IS USED WITH THE POWER SUPPLIES SPECIFIED, AND WITH CRYSTALS APPROVED BY PHILMORE MFG. CO. FOR USE IN THIS UNIT. NOTICE SPECIFICALLY THAT MANY CRYSTALS SOLD "FOR CITIZENS BAND UNITS" WILL NOT PERFORM PROPERLY WITH REGARD TO FREQUENCY TOLERANCE IN THIS UNIT. THE DEALER FROM WHOM YOU PURCHASED THIS UNIT CAN SUPPLY THE PROPER CRYSTALS APPROVED BY PHILMORE.

PART 19 OF THE F.C.C. REGULATIONS DEFINE OPERATION IN THE CITIZENS BAND SERVICE, AND YOU ARE REQUIRED TO READ AND UNDERSTAND THESE REGULATIONS PRIOR TO OPERATING THIS EQUIPMENT. AN ORDER FORM FOR THAT VOLUME OF THE REGULATIONS CONTAINING PART 19 IS ENCLOSED FOR YOUR CONVENIENCE. YOU ARE ALSO REQUIRED TO SUBMIT A COMPLETED COPY OF F.C.C. FORM 505 (PROVIDED WITH THE KIT), AND OBTAIN A VALID OPERATING LICENSE FROM THE F.C.C. PRIOR TO OPERATING THIS EQUIPMENT ON THE AIR. YOU WILL BE IN VIOLATION OF THE LAW IF YOU OPERATE INTO A RADIATING ANTENNA WITHOUT HAVING A LICENSE AND CALL SIGN.

SECTION II

PREPARING TO BUILD THE KIT

Unpacking and Checking

Veteran kit builders work with the firm conviction that every step in kit assembly is as important as every other step. This manual has been prepared to permit you to realize the greatest pleasure from the completed instrument with the fewest possible annoyances in the construction process.

Your first vitally important step is to unpack the kit carefully and then check the components against the parts list. Clear a generous portion of your workbench or table, and unpack each of the component boxes piece by piece. Handle delicate parts such as coils, variable capacitors, speaker, etc. gently.

Check each part for type and number against the parts list, referring to the drawings of components given in this book when in doubt as to the name of a given part. Prepare Mason Jar lids or any other compartmentalized container so that the hardware can be placed in separate "bins" as you check it off. If you discover a shortage, advise us promptly, including with your letter a full description of the missing part including part number. Your work will be expedited immeasurably if you will group the components in useful

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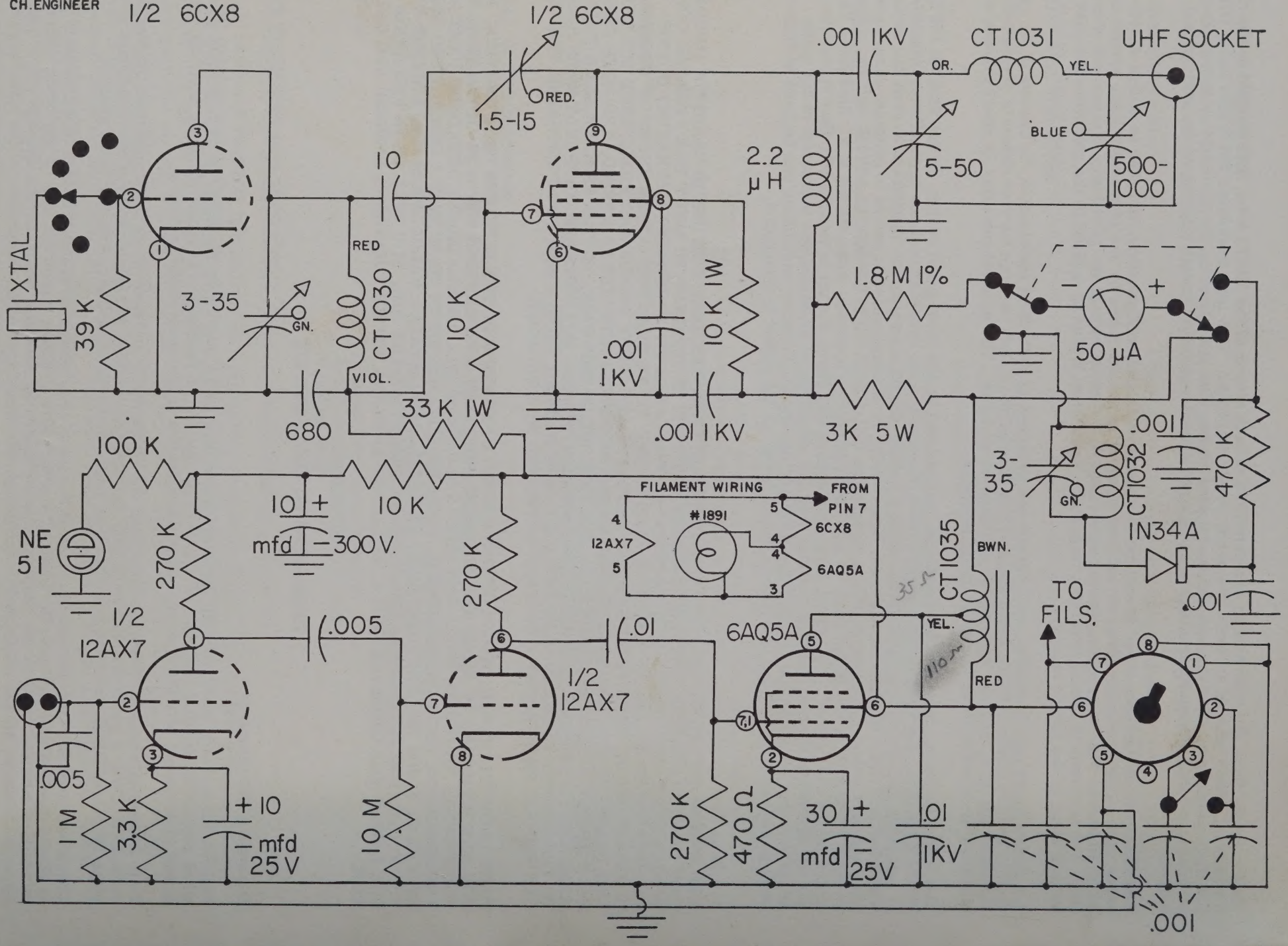
F.M.KAUFMAN
CH.ENGINEER

PHILMORE MODEL CT-1 C/B TRANSMITTER



categories for quick selection as you need them during assembly. Resistors, capacitors, coils, wire, hardware etc. should be kept separated but within easy reach.

Fold-in-Drawings

You will find the large fold-in drawings extremely handy. Tape the fold-ins on the wall above your workbench. This should be done, in particular, with the pictorial mounting and wiring diagrams. Since you will be referring to these constantly, you can avoid much page-turning and eyestrain by placing them where they will be in clear view at all times.

Soldering

If you are a novice at soldering, you will want to study the soldering instructions to be found inside the front cover of this book. If you are a veteran at kit-building, you may not need the instructions in detail but you must give careful attention to the special warnings given in the soldering instructions concerning the use of solder paste or flux.

WARNING!

ANY PHILMORE INSTRUMENT THAT HAS BEEN ASSEMBLED USING ACID CORE SOLDER OR PASTE FLUX WILL NOT BE SERVICED AT ANY TIME, NOR WILL SUCH EQUIPMENT BE CONSIDERED TO BE COVERED BY ANY WARRANTY OR GUARANTEE ISSUED BY THE COMPANY.

Component Tolerances

Your kit has been carefully engineered so that relatively large variations in component value will not affect the performance of the instrument. This applies to components such as resistors and potentiometers in which variations of ± 20% are common; capacitors in which variations may be as high as ± 50% (ceramic and mica); and electrolytic capacitors where the tolerance may exceed ± 75%. In any case, the components that appear in your kit have been factory-tested for acceptable tolerances so that there is no need for you to measure their values individually.

Interpretation of Wiring Instructions

To make your work proceed along smoothly, and to give you a check as to the progress of your wiring, you will find each step terminated by a notation in parenthesis. For example, in a step that might read:

"Connect the shorter green power transformer lead to lug NN. (crimp)."

we mean that the connection to lug NN on the pictorial should not be soldered at this time, but should merely be crimped around the lug. This keeps the lead open for a later connection where the soldering is accomplished all at one time.

Or in a step that reads:

"Connect the longer red lead to E1 (solder 1)"

we mean that the red lead that goes to lug number one on component E should be soldered at this time and that there will be only one soldered connection to this lug even after the instrument is completed.

Finally, in a step that reads"

"Connect B4 (solder 2) to F8 (crimp)."

we mean that point 4 on component B will now have two connections going to it and that both connections should now be soldered. This indicates that no further connections will be made to this terminal. On the other hand, we are not finished with connections to point 8 on component F, hence the wire going here is to be crimped, not soldered, at this time.

One more point. It sometimes happens that there are two resistors of the same type that have identical values but different power dissipations. Unless stated otherwise, a resistor connection refers to the 1/2 watt size. If a larger resistor is to be used, the power rating will be given.

SECTION III

MAJOR MOUNTING AND SUB-ASSEMBLIES

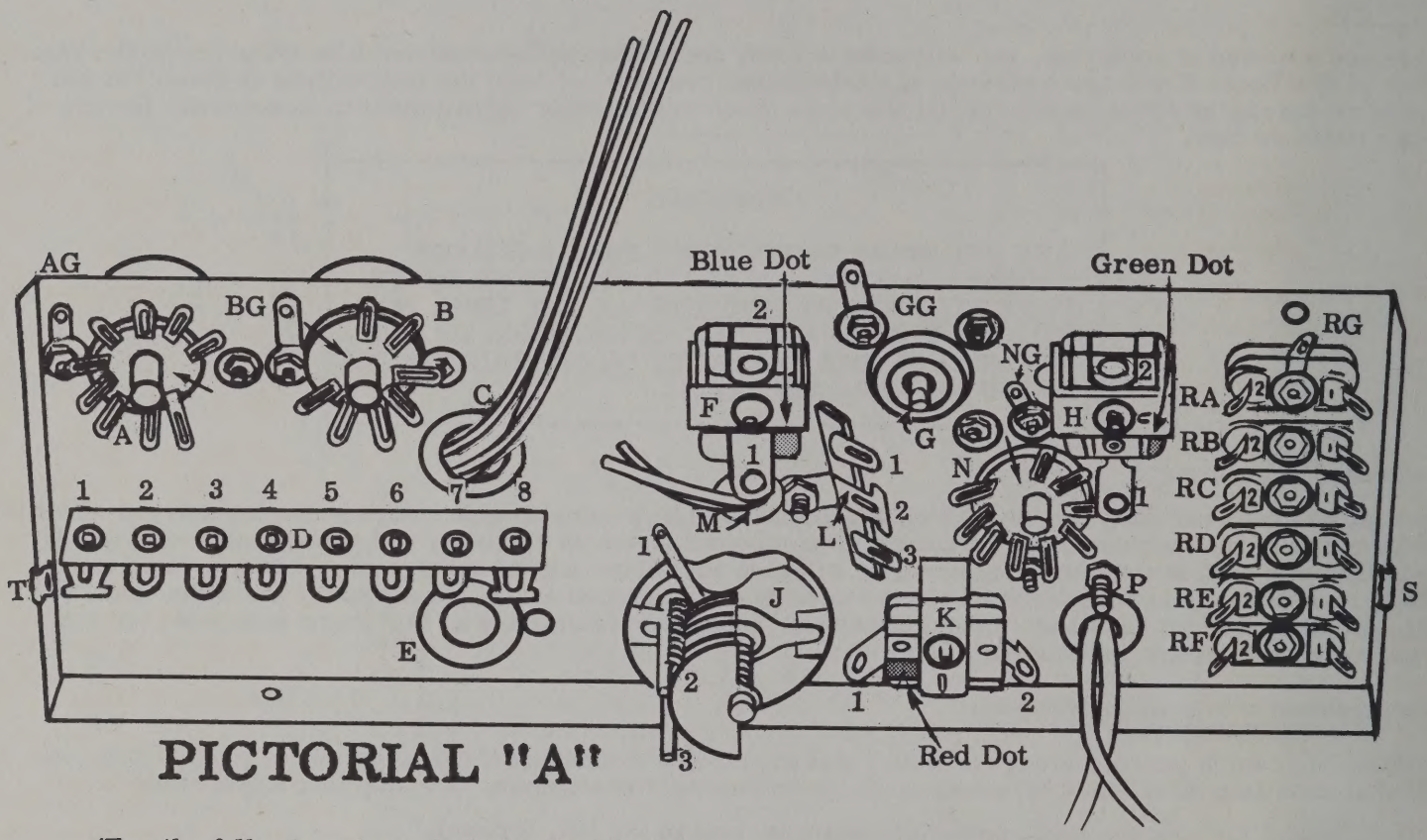
Mounting of Major Components

Your attention is called to the special preliminary procedures presented in detail in Section II. Work should not be started before this section has been carefully read. We will assume that the kit has been

carefully unpacked and checked against the parts list so that all components have been identified. The various items of hardware should be laid out as suggested for ready availability, and should be further identified against the list below. In general, lockwashers are used under most of the nuts except where otherwise noted. All tube sockets are mounted with their metal portions outside the chassis; only the phenolic extrusions with the tube pins appear inside the chassis. All screws are fastened so that their heads are above the chassis with the nuts and lockwashers inside.

MOUNTING PROCEDURE

(As each step is completed, check off the circle next to that step)



PICTORIAL "A"

(For the following steps, refer to Pictorial "A")

○ Place the chassis in front of you on the work bench so that the lip on the long edge is pointing towards you as shown in Pictorial "A". Mark all holes and mounting positions with a grease pencil to correspond with Pictorial "A".

○ Position "A". Mount a 9 pin tube socket at this position, with the metal shield clip on the outside of the chassis, and with the bakelite portion and tube pins inside. Rotate the socket so that the opening between pins 1 and 9 is to the right, as indicated by the arrow in Pictorial "A". Fasten with two 4-36 x 1/4" screws, nuts, lockwasher, and #4 ground lug under the nut at position "AG". Make sure that the ground lug is as shown, and bend up at right angles to the chassis after tightening.

○ Position "B". In the same manner, mount a 7 pin tube socket at this position, rotating so that the opening between pins 1 and 7 is to the left as indicated by the arrow. Make sure to mount a #4 ground lug under the nut at position "BG", and bend up.

○ Position "N". Mount a second 9 pin tube socket at this position, with the opening between lugs 1 and 9 as indicated by the arrow. Mount a ground lug under the nut at position "NG", and bend up.

○ Position "E". Mount a 3/8" x 7/16" grommet (the largest grommet supplied) at this position. Do not force into the hole with a sharp metal instrument, or you will tear the grommet.

○ Position "C". Mount a 1/4" x 3/8" grommet (medium size) at this position, observing the same precautions as in the previous step.

○ Position "M". In the large hole at this position, mount one of the two 7/32" x 11/32" grommets.

○ Position "P". In the large hole at this position, mount the remaining 7/32" x 11/32" grommet.

Position "G". Mount the UHF socket at this position, with the metal portions of the socket outside the chassis. Rotate so that the cup in the center terminal is pointing towards the back edge of the chassis. Fasten with four 4-36 x 1/4" screws, nuts, lockwashers, and a #4 ground lug under the nut at position "GG". Tighten securely.

Position "RA". Mount a ceramic crystal socket at this position with the entire ceramic portion of the socket inside the chassis. Place so that the numeral "1" stamped on the socket is to the right. Fasten with a 4-36 x 3/8" screw (these are the longer 4-36 screws supplied). Mount a #4 groung lug under the nut inside the chassis, and tighten moderately. Do not over-tighten the screw, or you will crack the ceramic.

Position "RB". Mount a second crystal socket at this position with a 4-36 x 3/8" screw, nut, and lockwasher. In the same manner, mount the remaining crystal sockets at position "RC", "RD", "RE", and "RF". Do not over-tighten the nuts.

Position "H". Select the mica trimmer capacitor having the GREEN dot on the corner. Push the bracket lugs into the holes at this position, turning so that the color coded corner is at the lower right hand side as shown in Pictorial "A". On the outside of the chassis, insert a screwdriver blade in the slot on each of the lugs, and twist to fasten the trimmer securely to the chassis. Push the bracket against the chassis while doing this so that it will fasten flush with the chassis.

Position "F". In the same manner, mount the mica trimmer capacitor with the BLUE color code at this position. Rotate so that the color coded corner is as shown in Pictorial "A".

Position "K". In a similar manner, mount the mica trimmer capacitor with the RED code at this position, turning so that the color coded corner is in the position shown in Pictorial "A".

Position "D". On the outside of the chassis, place the modulation choke, bearing the part No. CT1035, on the chassis, and rotate so that the three leads feed directly into the grommet at position "C". Pass a 6-32 x 3/8" screw through the hole in the mounting lug to the left, and into the chassis hole near position "D-1". On the wiring side of the chassis, place the 8 lug terminal strip mounting lug over the screw coming through this hole, as shown in Pictorial "A", and fasten loosely with a 6-32 nut and lockwasher. Now place a second 6-32 x 3/8" screw through the hole in the other mounting lug of the choke, into the matching chassis hole near position "D-6", and fasten securely with a 6-32 nut and lockwasher. Place a third 6-32 x 3/8" screw through the chassis in the hole near position"D-8", from the outside of the chassis. Slip the mounting bracket of terminal strip "D" over the screw, and fasten securely with a 6-32 nut and lockwasher. Now tighten the screw at "D-1". Make sure that all of the leads are fed through grommet "C".

Position "M". Select the large coil which bears the part number "CT1031". This coil has fewer turns than the other coil, which is similar in appearance. On the outside of the chassis, fee the two leads into the grommet at position "M", and insert the two mounting screws into the holes alongside the grommet. On the wiring side of the chassis, fasten the left mounting screw securely with a 6-32 nut and lockwasher. Slip the mounting lug of the 3-lug terminal strip over the screw on the right side at position "L", and fasten securely with another 6-32 nut and lockwasher. Make sure that terminal strip "L" is in the position shown in Pictorial "A".

Position "P". In the same manner, slip the leads of coil CT1030 into the grommet at this position from the outside of the chassis and the mounting screws into the holes adjacent to the grommet. Fasten on the wiring side of the chassis with 6-32 nuts and lockwashers.

Position "J". Now select the air padder capacitor. Make sure that the shaft of this capacitor is rotated so that the plates are fully meshed. Position over the holes at position "J" as shown in Pictorial "A", and hold in place with one hand. On the outside of the chassis, put one of the 4-40 x 1/4" round head screws into one of the small holes at this position, and into the threaded bushing of the capacitor, and fasten lightly . Adjust the position of the capacitor and fasten in the other hole with a second 4-40 x 1/4" round head screw. Tighten both screws securely.

Position "S". Select one of the two Tinnerman clips, and slip over the edge of the chassis at this position, so that the long leg of the clip is inside the chassis, and so that it seats properly over the hole.

Position "T. In the same manner, fasten the second Tinnerman clip over the hole at this position with the long leg of the clip inside the chassis.

(For the following steps, refer to Figure 1).

Dress the RED wire coming through grommet "C" down flat against terminal strip "D" over to "D-2", and cut off to length. Strip 1/4" of insulation from the end of this wire, twist the strands together, and insert in the rivet hole on the phenolic portion at lug "D-2" and (solder 1).

Cut off a 4" length of BROWN wire and strip both ends back 1/4". Connect one end to socket "A" lug 4 (solder 1). Dress the wire flat to the chassis, down along the side fold of the chassis, across to the right below terminal strip "D", and up to "D-5" (crimp).

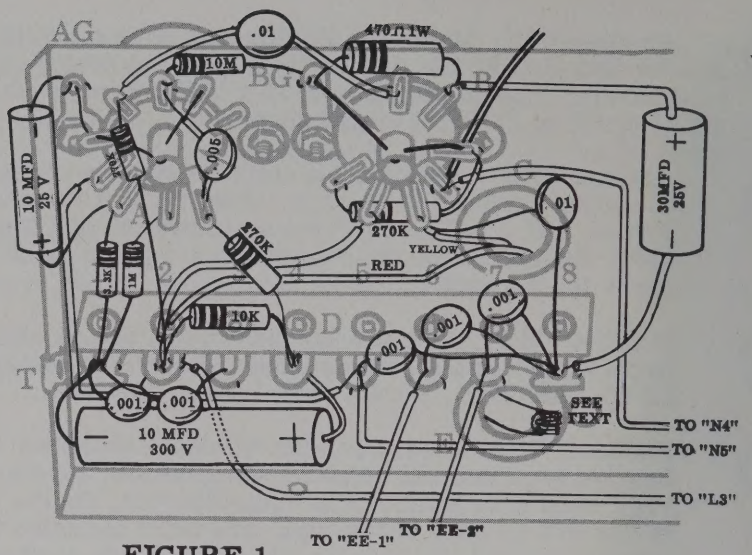


FIGURE 1.

Pass one end of a piece of bare wire in succession through socket "A" lug 8, two holes in the center shield of socket "A", through socket "A" lug 5, and through the hole in ground lug "AG". Crimp around "AG", solder "A-5", solder the center shield, cut off excess wire at "A-8" and (solder 1).

Pass a piece of bare wire in succession through socket "B" lug 3, through two holes in the center shield of socket "B", and into the hole of ground lug "BG". Cut off the excess lead at "B-3" and (crimp). Solder the center shield connection and crimp at "BG".

Cut one lead of a 3.3 K ohm resistor (orange-orange-red) to a length of 1/2", and connect to socket "A" lug 3 (crimp). Dress the body of the resistor flat to chassis and connect the other end to terminal strip "D" lug 1 (crimp).

Cut one lead of a 1 Megohm resistor (brown-black-green) to a length of 1/2", and connect one lead to socket "A" lug 2 (crimp). Dress the body of the resistor flat to chassis and next to the resistor just installed and connect the other end to terminal strip "D" lug 1 (crimp).

Cut one lead of a 270 K ohm resistor (red-violet-yellow) to a length of 1/2" and connect this lead to socket "A" lug 1 (crimp). Dress the body of the resistor close to the chassis and connect the other end to terminal strip "D" lug 4 (crimp).

Cut both leads of a 10 Megohm resistor (brown-black-blue) to a length of 3/4". Connect one lead to socket "A" lug 7 (crimp). Dress the body of the resistor flat to the chassis, and connect the other lead to ground lug "BG" (crimp).

Cut both leads of a 470 ohm, 1 watt resistor (large body, yellow- violet-brown) to a length of 1/2". Connect one lead to ground lug "BG" (solder 3). Dress the resistor body flat to the chassis, and connect the other lead to socket "B" lug 2 (crimp).

Cut one lead of another 270 K ohm resistor (red-violet-yellow) to a length of 1/2", and connect to socket "B" lug 7 (solder 1). Slip a 1/2" piece of sleeving over the other lead down to the resistor body. Dress the resistor body flat to the chassis, and connect this lead to socket "B" lug 3 (solder 2).

Inspect the 10 MFD, 25 V Electrolytic capacitor. One end is marked with a (-) sign, and the other end is marked with a (+) sign. Slip the lead from the (-) end into ground lug "AG", push the body of the capacitor close to this lug, and (solder 2). Slip a 1/2" of sleeving over the other lead from the (+) side and connect this lead to socket "A" lug 3 (solder 2). Dress the body of the capacitor into the corner of the chassis.

Slip a 1/2" piece of sleeving over each lead of a .01 MFD disc capacitor. Connect one lead, up to the sleeving, to socket "A" lug 6 (crimp). Connect the other lead, up to the sleeving, to socket "B" lug 1 (solder 1). Dress the capacitor straight up perpendicular to the chassis.

Slip a 1/2" piece of sleeving over one lead of a 270 K ohm resistor (red-violet-yellow) and connect this lead, up to the sleeving, to socket "A" lug 6 (solder 2). Put a right angle bend in this lead so that the resistor is parallel to the chassis and connect the other lead to terminal strip "D" lug 2 (crimp).

Slip a 1/4" length of sleeving over each lead of a .005 MFD Disc capacitor. Connect one lead, up to the sleeving, to socket "A" lug 7 (solder 2). Connect the other lead, up to the sleeving to socket "A" lug 1 (solder 2). Dress the body of the capacitor straight up away from the socket and over the center shield. Make sure that neither lead shorts to the center shield or to other lugs.

Cut both leads of a 10 K ohm, small size resistor, (brown-black-orange) to a length of 3/4". Connect one lead to terminal strip "D" lug 2 (crimp). Dress the body of the resistor flat against the terminal strip, and connect the other lead to terminal strip "D" lug 4 (crimp).

Strip both ends of a 2-1/2" piece of RED wire back 1/4" and connect one end to socket "B" lug 6 (solder 1). Dress the wire flat to the chassis and connect the other end to terminal strip "D" lug 2 (crimp).

Cut the YELLOW lead coming through grommet "C" 1/4" longer than necessary to reach "B-5". Strip back 1/4", twist the strands tightly and tin with solder. Now connect to "B-5" (crimp).

Cut one lead of a .01 MFD disc capacitor to a length of 1/2" and connect this lead to socket "B" lug 5 (solder 2). Dress the body of the capacitor flat against the chassis and connect the other lead to terminal strip "D" lug 8 (crimp).

Strip both ends of a 7" piece of BROWN wire back 1/4". Connect one end to socket "B" lug 4 (crimp). Dress the wire flat to the chassis, straight across, and then down to the bottom fold next to the edge of the terminal strip "D", and then across to the right, inside the fold of the chassis. Leave the other end free for the moment.

Strip both ends of a 2" length of BROWN wire back 1/4", and connect one end to socket "B" lug 4 (solder 2). Dress the other end of the wire straight up in the air and leave free.

Cut the (+) lead of the 30 MFD 25 V electrolytic capacitor to a length of 1" and connect this lead to socket "B" lug 2 (solder 2). Put a right angle bend in the lead near the body of the capacitor and connect the (-) lead to terminal strip "D" lug 8 (crimp).

Strip both ends of a 7" piece of BROWN wire back 1/4" and connect one end to terminal strip "D" lug 5 (crimp). Dress the wire down to the chassis, straight back to the chassis lip, to the right inside the chassis lip, and up between trimmer "K" and grommet "P", and connect the other end to socket "N" lug 5 (solder 1). Now connect the free end of the other BROWN lead to socket "N" lug 4 (solder 1). Dress this lead flat to chassis next to the wire just installed. See Figure 2.

Connect a small .001 MFD disc capacitor from terminal strip "D" lug 2 (crimp) to terminal strip "D" lug 1 (crimp). Keep the leads as short as possible, and dress the body of the capacitor flat to the strip.

Slip a 1/2" piece of sleeving over one lead of another small .001 MFD disc capacitor and connect this lead to terminal strip "D" lug 3 (crimp). Connect the other lead to terminal strip "D" lug 1 (crimp). The body of the capacitor should lie flat against the capacitor previously installed.

Connect a small .001 disc capacitor from terminal strip "D" lug 7 (crimp) to terminal strip "D" lug 8 (crimp). Keep the leads as short as possible and press the body of the capacitor flat against the terminal strip.

Slip a 1/2" piece of sleeving over one lead of another small .001 MFD disc capacitor and connect this lead to terminal "D" lug 6 (crimp). Connect the other lead to terminal strip "D" lug 8 (crimp). The body of the capacitor should lie flat against the strip over the capacitor body previously installed.

Slip a 3/4" length of sleeving over one lead of another small .001 MFD disc capacitor and connect this lead to terminal strip "D" lug 5 (crimp). Connect the other lead to terminal strip "D" lug 8 (crimp). Keep the body near the strip and next to the capacitors previously installed.

Strip both ends of a 7" piece of RED wire back 1/4". Connect one end to terminal strip "D" lug 2 (crimp). Dress the wire flat to the chassis, back to the fold at the chassis lip, across to the right inside the lip, straight up next to capacitor "J", to the right between "J" and grommet "M" and connect the other end to terminal strip "L" lug 3 (crimp). Make sure this wire is flat against the chassis. See Figure 2.

Now, strip off 3" of the plastic outer jacket of the length of 6 conductor cable. This can be most easily done by carefully slitting with a sharp knife along the entire 3" length, peeling the jacket back to the end of the cut, and then cutting off with the knife or a pair of wire cutters. Be careful not to damage the shield braid, or the insulation of the conductors.

Feed the cable into the grommet at position "E" from the other side of the chassis. Untwist the shield braid all the way back to the end of the jacket, and retwist to form another lead. Cut this braid lead to a length of 1", tin the end with solder and connect to terminal strip "D" lug 8 (solder 6).

Cut the WHITE lead to a length of 1" and strip back 1/4". Twist the strands tightly together, tin with solder and connect to terminal strip "D" lug 7 (crimp).

Cut the BLACK lead to a length of 1" and strip back 1/4". Tin with solder and connect to terminal strip "D" lug 6 (crimp).

Cut the BROWN lead to a length of 1-1/4" and strip back 1/4". Twist tightly, tin with solder, and connect this lead to terminal strip "D" lug 5 (solder 4).

Cut the BLUE lead to a length of 2-1/2", strip back 1/4", twist and tin, and connect this lead to terminal strip "D" lug 3 (crimp).

Cut the RED lead to a length of 2-3/4", strip back 1/4", twist and tin, and connect this lead to terminal strip "D" lug 2 (solder 7). Make sure the solder flows over all leads connected to this lug and that the lead connected to the rivet hole of the lug is properly soldered and not shorting to chassis.

Strip the end of the YELLOW lead back 1/4" and twist and tin, and connect this lead to terminal strip "D" lug 1 (crimp).

Slip a 1" piece of sleeving over the end of the lead marked "Positive" on the 10 MFD 300 V. electrolytic capacitor, stamped with the part no. CT1022. Slide the sleeving back to the face of the capacitor and cut the lead off 1/4" past the end of the sleeving. Connect this lead to terminal strip "D" lug 4 (crimp). Place the capacitor next to the chassis over the wires previously installed, between terminal strip "D" and the bottom lip. Cut the lead at the other end to a length of 1" and connect to terminal strip "D" lug 1 (solder 6). Make sure that solder flows all over leads connected to "D-1".

Now take one of the bare leads cut from the capacitor previously installed and connect to terminal strip "D" lug 6 (solder 3). Slip a 2-1/2" piece of sleeving over this lead and leave the other end free.

Connect the other piece of bare lead cut from the capacitor to terminal strip "D" lug 7 (solder 3). Slip another 2-1/2" piece of sleeving over this lead and leave the other end free.

This completes the wiring of the audio portion of the Transmitter. At this time only "A-2", "A-9" (no connections), "D-3", and "D-4" should remain unsoldered. All other terminals should be cleanly soldered. Make sure that no short circuit exists between terminals and leads and that all components and wires are dressed as shown in Figure 1. Shake out all wire clippings and excess solder blobs.

(For the following steps, refer to Figure 2)

At socket "N", rotate the center shield pin so that two of the holes line up with pins 1 and 6. In succession, slip a piece of bare wire through lug 1, the two holes in the center shield, and crimp around lug 6. Bring the free end over and connect to ground lug "NG" (crimp). Now solder "N-1" and the center shield. Make sure the wire does not short to lug 9.

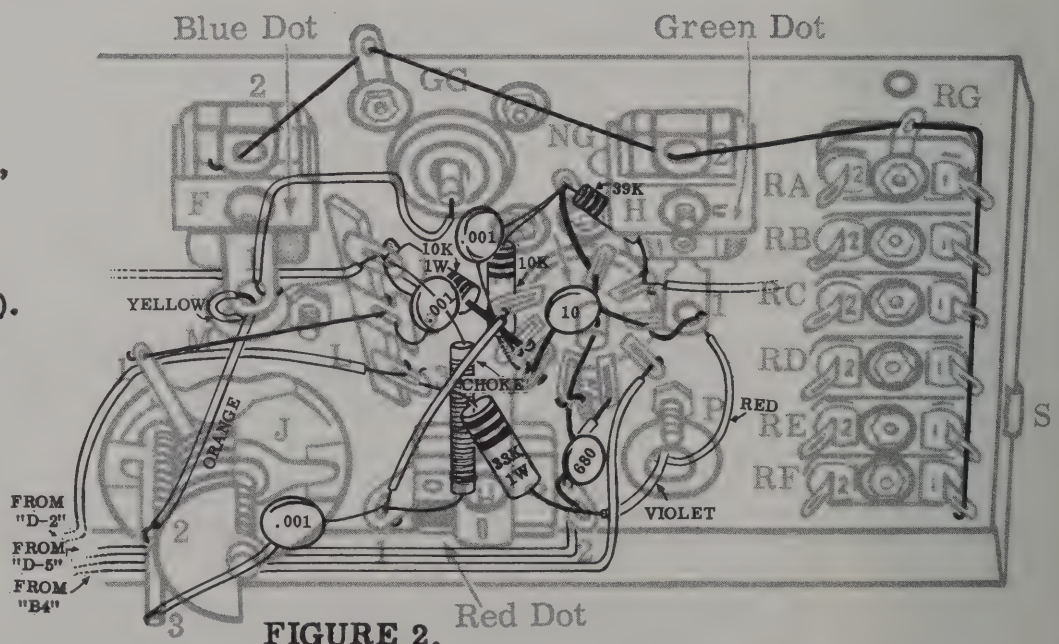


FIGURE 2.

Carefully twist the #1 lug on each of the crystal sockets a half turn to the right. Feed a length of bare wire through each of these lugs in turn, starting with "RA-1 and crimping the end around "RF-1". From "RA-1" measure a length of 4-1/2" and cut the wire. Now solder the "RA-1", "RB-1", "RC-1", "RD-1", "RE-1" and "RF-1".

Feed the free end of this wire through the hole in ground lug "RG" (solder 1), through the hole in "H-2", through ground lug "GG", (solder 1) and into "F-2" (solder 1).

Strip both ends of a 2" piece of BLACK wire and connect one end to terminal strip "L" lug 2 (crimp), and connect the other end to capacitor "J" lug 1 (solder 1).

Carefully cut the YELLOW lead appearing through grommet "M" 1/4" longer than necessary to reach trimmer "F" lug 1. Slip the sleeving part way up the wire and cut off 1/4". Push the sleeving back down on the wire so that 1/4" of enameled wire is exposed. With a knife or razor blade, scrape as much of the enamel from this wire as possible and carefully tin the wire with solder. Connect this wire to "F-1" (crimp).

In a similar manner, cut, strip, and tin the ORANGE wire from grommet "M" to length and connect to capacitor "J" lug 2 (solder 1). The wire should wrap tightly around the notch in "J-2".

In a similar manner, cut, strip, and tin, the VIOLET lead appearing through grommet "P" to length and connect to trimmer "K" lug 2 (crimp).

Again in the same manner, cut, strip, and tin the RED lead from grommet "P" and connect to capacitor "H" lug 1 (crimp). This lead should be dressed flat to the chassis.

Pass one lead of a 39 K ohm resistor (orange-white-orange) through ground lug "NG". Position so that the body of the resistor is flat to the chassis under the corner of trimmer "H", and crimp this lead to "NG". Now connect the other end to socket "N" lug 2 (crimp).

Cut one lead of a 10 K ohm, 1/2 watt resistor (small body, brown-black-orange) to a length of 1/2". Connect this lead to socket "N" lug 7 (crimp). Dress the body of the resistor flat to the chassis and connect the other end to ground lug "NG" (crimp).

Cut one lead of a 10 K ohm, 1-watt resistor (large body, brown-black-orange) to a length of 1/2". Connect this lead to socket "N" lug 8 (crimp). Dress the body of the resistor flat to the chassis, and connect the other lead to terminal strip "L" lug 1 (crimp).

Cut both leads of a .001 MFD, 1 KV disc capacitor (larger body) to a length of 1/2". Connect one lead to socket "N" lug 8 (solder 2). Connect the other end to ground lug "NG" (solder 4). Make sure solder flows over all connections to lug "NG". Dress the body of the capacitor straight up away from the socket.

Cut one lead of a 680 MMFD disc capacitor to a length of 1/2" and connect to socket "N" lug 6 (solder 2). Connect the other lead to trimmer "K" lug 2 (crimp). Dress the body of the capacitor straight up from the socket and straight across from "K-2" to "N-6". Keep the lead to "K-2" as short as possible.

Cut one lead of a 33K ohm, 1-watt resistor (large body, orange-orange-orange) to a length of 1/2" and connect this lead to terminal strip "L" lug 3 (solder 2). Dress the body of the resistor straight across over the bracket of trimmer "K", and connect the other lead to "K-2" (solder 3).

Connect a .001 MFD, 1 KV disc capacitor from terminal strip "L" lug 1 (crimp) to terminal strip "L" lug 2 (solder 2). Keep the leads as short as possible and place the body of the capacitor flat against the 10 K ohm 1 watt resistor, parallel to the chassis.

Cut one lead of a 2.2 Microhenry RF choke to a length of 3/4". Put a right angle bend in this lead close to the body of the choke and connect this end to terminal strip "L" lug 1 (crimp). Slip a 1/2" piece of sleeving over the other lead close to the body of the choke, and connect this lead to trimmer "K" lug 1 (crimp). The body of the choke should be parallel to strip "L" and about 1/2" away from it.

Slip a 1/4" piece of sleeving over one lead of a 10 MMFD disc capacitor and push the sleeving close to the capacitor body. Slip this lead through the hole in lug 3 on socket "N" from the inside and solder, but do not cut off the excess. Now slip a 3/4" piece of sleeving over this excess lead and connect the other end to trimmer "H" lug 1 (solder 2). Cut the other lead of the capacitor to a length of 1/2" and connect to socket "N" lug 7 (solder 2). Dress the body of the capacitor straight up away from the socket.

Strip both ends of a 2" piece of YELLOW wire back 1/2". Connect one end to socket "N" lug 2 (solder 2). Dress the wire straight up and leave the other end free.

Strip both ends of a 3-3/4" piece of BLUE wire back 1/4". Connect one end to socket "N" lug 9 (solder 1). 1" from this pin, make a sharp right angle bend in the wire towards trimmer "K". Make another sharp bend DOWN, 1-1/2" from the previous bend, and connect the free end to trimmer "K" lug 1 (crimp). This wire must sit straight up away from the other components.

Strip both ends of a 2" piece of BLUE wire back 1/4". Connect one end to the center terminal of socket "G" (solder 1). Make a right angle bend in this wire, 1/2" from the end of the terminal and connect the other end directly over to trimmer "F" lug 1 (solder 2). This wire must also sit straight up perpendicular to the chassis.

Cut one lead of a .001 MFD 1 KV disc capacitor to a length of 1-1/2", and cover with sleeving. Connect this lead to capacitor "J" lug 3 (solder1). Slip 1/2" piece of sleeving over the other lead, down to the capacitor body, and connect this lead to trimmer capacitor "K" lug 1 (solder 3). The lead should wrap tightly around the groove in "J-3". The body of the capacitor should be parallel to the chassis directly above capacitor "J". (See Figure 2). Make sure rotor of "J" clears the lead.

Strip both ends of a 6" length of RED wire. Connect one end to terminal strip "L" lug 1 (solder 4). Dress the wire flat down to the chassis across to the left between trimmer "F" and grommet "M" and make a bend upwards in the wire just past the nut at "M". Leave the other end of the wire free.

This completes the wiring of the RF portion of the Transmitter. At this time only lug "H-2" should remain unsoldered of the terminals to which connections have been made in this section. Make sure that all other terminals are cleanly soldered and short circuits due to excess solder do not exist between them. It is extremely important that leads on all components be as short as possible, and dressed neatly in accordance with Figure 2. Shake out all wire clippings and excess solder blobs.

(For the following steps, refer to Figure 3)

Place the shield bracket on the work bench so that it corresponds to the position shown in figure 3. Insert the 1/8" x 1/4" small rubber grommet in the hole at position "X".

At position "W", mount the last mica trimmer capacitor with the GREEN color coded corner in the same position as shown in Figure 3, and fasten snugly to chassis as before. Bend both lugs partially outwards.

At position "U", mount one of the 5 lug terminal strips with the head of a 6-32 x 3/8" screw on the lug side of the bracket and fasten securely with a 6-32 nut and lockwasher. Lug 2 of trimmer capacitor "W" should bear against lug 5 of this bracket.

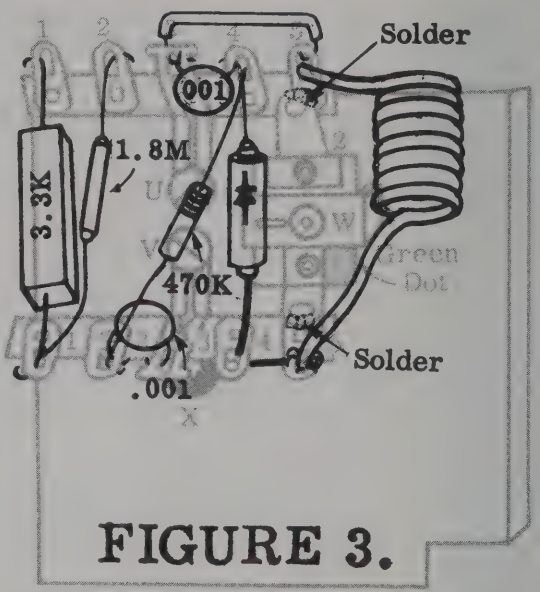


FIGURE 3.

In a similar manner, mount the second 5 lug terminal strip at position "V" with a 6-32 x 3/8" screw, nut and lockwasher. Lug 1 of trimmer "W" should bear against lug 5 of this bracket.

Solder lug 2 and lug 1 of trimmer "W" to lugs #5 of strips "U" and "V" respectively, making sure that the hole in each lug #5 is not blocked with solder.

Connect a small size .001 MFD disc capacitor from lug 3 to lug 4 of terminal strip "U". Make the leads as short as possible and place the body of the capacitor flat against the terminal strip. Crimp both leads.

In the same manner, connect a second small .001 MFD disc capacitor from lug 2 to lug 3 of terminal strip "V". Dress the body of the capacitor flat against the terminal strip and keep the leads short. Crimp both leads.

Connect a short length of BLACK wire from terminal strip "U" lug 3 (solder 2), to terminal strip "U" lug 5 (crimp).

Now examine the crystal diode. You will notice that a polarity marking is on the diode consisting of an arrowhead and a vertical line. Pass the lead at the vertical line end (cathode) through lug 4 of terminal strip "U". Pass the lead at the arrowhead end (anode) through lug 4 of terminal strip "V". At "U-4" crimp the lead around the terminal . At "V-4" bend the lead to the right, pass through "V-5" and (crimp). Now solder "V-4". When soldering a crystal diode do not apply heat for too long a time to the lead, as excess heat will ruin the element. A heat sink, such as a pair of pliers or an alligator clip on the lead between the diode and the soldered point will greatly add to the safety of soldering.

Connect a 470 K ohm resistor (yellow-violet-yellow) diagonally across between the strips from terminal strip "U" lug 4 (solder 3), to terminal strip "V" lug 2 (crimp). At "U-4" observe the precautions outlined above about soldering crystal diode lead.

Straighten both leads of the 3,000 ohm wirewound resistor (rectangular ceramic case) and slide the resistor flat against the chassis between lugs #1 of terminal strips "U" and "V". Holding the resistor flat against the bracket, bend up one lead and connect to "U-1" (crimp) from outside of the strip. In the same manner bend up the other lead and connect to "V-1" (crimp). Make sure that the resistor is as flat to the chassis as possible to provide best heat transfer.

Connect the 1.8 Meg ohm, 1% precision resistor (value stamped on body) diagonally between terminal strip "U" lug 2 (crimp) and terminal "V" lug 1 (crimp).

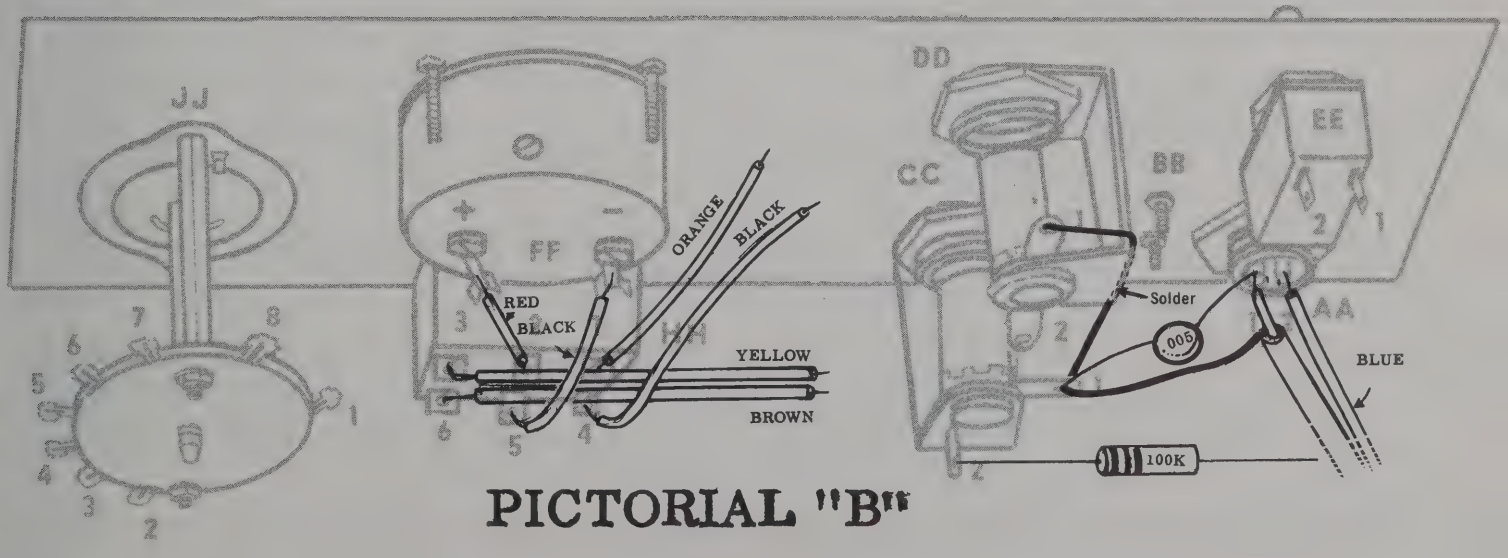
Now mount the bracket on the chassis as shown in Pictorial "C". Make sure that the notch in the mounting leg of the bracket clears the end of terminal strip "D", and that the BROWN wire connected to "B-4" and running down the chassis lies on top of this leg so as not to pinch it between the bracket and the chassis.

Pass the BROWN choke lead appearing through grommet "C" in the chassis to the left through the hole in grommet "X" on the bracket. Pass this lead below the lugs and phenolic strips of terminal strips "V" and "U" and connect to strip "U" lug 1 (crimp). See Pict. "C".

Dress the RED wire coming from lug 1 of terminal strip "L" up against the bracket, parallel to strip "V", and connect the free end to strip "V" lug 1 (solder 3). See Pict. "C".

Now connect the self supporting meter pickup coil between terminal strip "U" lug 5, (solder 2) and terminal strip "V" lug 5 (solder 2). Be extremely careful, when making these connections, not to distort the windings of the coil. Dress the coil straight up away from the two terminal strips and about 1/4" away from the wire connecting "F-1" and "G". See Fig. 3.

This completes the wiring of the bracket to the chassis. Put this completed assembly aside for the moment, and refer to Pictorial "B" for the following steps.



PICTORIAL "B"

Place the front panel unit on the work bench as shown in Pictorial "B". Mark all holes to correspond with the markings shown in Pictorial "B".

Remove the nut and lockwasher from the mike socket and insert from the front of the panel in the hole at "AA" marked "MIKE". Rotate so that the #2 stamped on the plastic is to the right. Fasten inside the panel in this position with the nut and lockwasher.

Place the microphone bracket on the front of the panel so that the mounting holes align with the panel holes at position "BB" under the word "CALL" on the panel. The longer leg of this bracket containing one of the holes should point toward the bottom fold of the panel. Fasten with two 6-32 x 3/8" screws, nuts, and lockwashers. The heads of the screws should be on the front of the panel. When properly mounted, this bracket will have the large square opening for the microphone body angling up and forward from the bottom fold of the panel.

Remove the clear plastic jewel, nut, and bushing from one of the pilot sockets, and also the "NE-51" bulb. Insert the bushing from the front of the panel in the hole at "CC". Inside the panel, place the body of the socket over the bushing so that the long flat side is against the panel bottom. Place the nut over the bushing and tighten in this position.

In the same manner, disassemble all parts of the pilot light socket with the RED jewel, and mount at position "DD". Rotate so that the long flat side is perpendicular to the panel bottom.

Mount the single pole, single throw switch in the hole at position "EE". (This is the smaller switch with only 2 lugs). Remove and discard any "ON-OFF" plate on the switch. One nut should be inside the panel, and the other outside. Set the position of the inside nut so that the outer nut, when tightened, is flush with the face of the switch shaft. Rotate so that the two lugs are near the top edge of the panel.

In the same manner as the other switch, mount the double pole, double throw switch at position "HH". (This switch has six lugs). Place so that the body of the switch is parallel to the fold of the panel. Discard any "ON-OFF" plate and adjust the nuts so that the outside nut is flush with the end of the shaft. The toggle on this switch should move left-to-right.

Remove the meter carefully from its box, and remove any wire shunted across the two terminals. The meter mounting nuts may be threaded on the screws. If so, remove and set aside. Otherwise, they will be found in a small bag inside the box. Place in the meter hole at position "FF" from the front of the panel so that the printing on the front face of the meter is upright. Fasten the meter inside the panel securely with the four mounting nuts.

Slide a 3/8" control lockwasher over the shaft of the selector switch and place the switch inside the panel in the hole at "JJ". On the front of the panel, place a flat control washer and control nut on the shaft. Rotate the switch so that the two tubular posts are parallel to the right edge of the panel, and so that lug 1 is pointing towards meter "FF" as shown in Pictorial "B". Now tighten the nut.

Connect a piece of bare wire from socket "CC" lug 1 (crimp) to socket "DD" lug 1 (solder 1). Solder to bracket of socket "DD".

Connect a .005 MFD disc capacitor from mike socket "AA" lug 1 (crimp) to socket "CC" lug 1 (crimp). The body of the capacitor should be close to "AA". Make sure that the lead connected to "AA-1" does not short to the shell of this socket.

Bend lug 2 of socket "CC straight up. Cut one lead of a 100 K ohm resistor (brown-black-yellow) to a length of 1", and connect this lead to socket "CC" lug 2 (solder 1). Dress the resistor straight over to the right and leave the other end free.

Carefully strip of 2" of the outer jacket of the one conductor shielded cable. Untwist the shield braid and retwist to form a second lead. Cut the center conductor to a length of 1", strip back 1/4" and tin with solder. Connect this center conductor to mike socket "AA" lug 1 (solder 2). Make sure the soldered connection does not short to the outside shell of the socket. Connect the shield braid lead to socket "CC" lug 1 (solder 3). Leave the other end of this cable free.

Strip both ends of a 3-1/2" piece of BLUE wire back 1/4" and connect one end to mike socket "AA" lug 2 (solder 1). Leave the other end of this wire free for the moment.

Strip both ends of a 1-1/2" piece of BLACK wire and connect one end to switch "HH" lug 5 (solder 1). Connect the other end to meter "FF" lug (-) (solder 1).

Strip both ends of a 2" piece of RED wire and connect one end to switch "HH" lug 2 (solder 1). Connect the other end to meter "FF" lug (+) (solder 1).

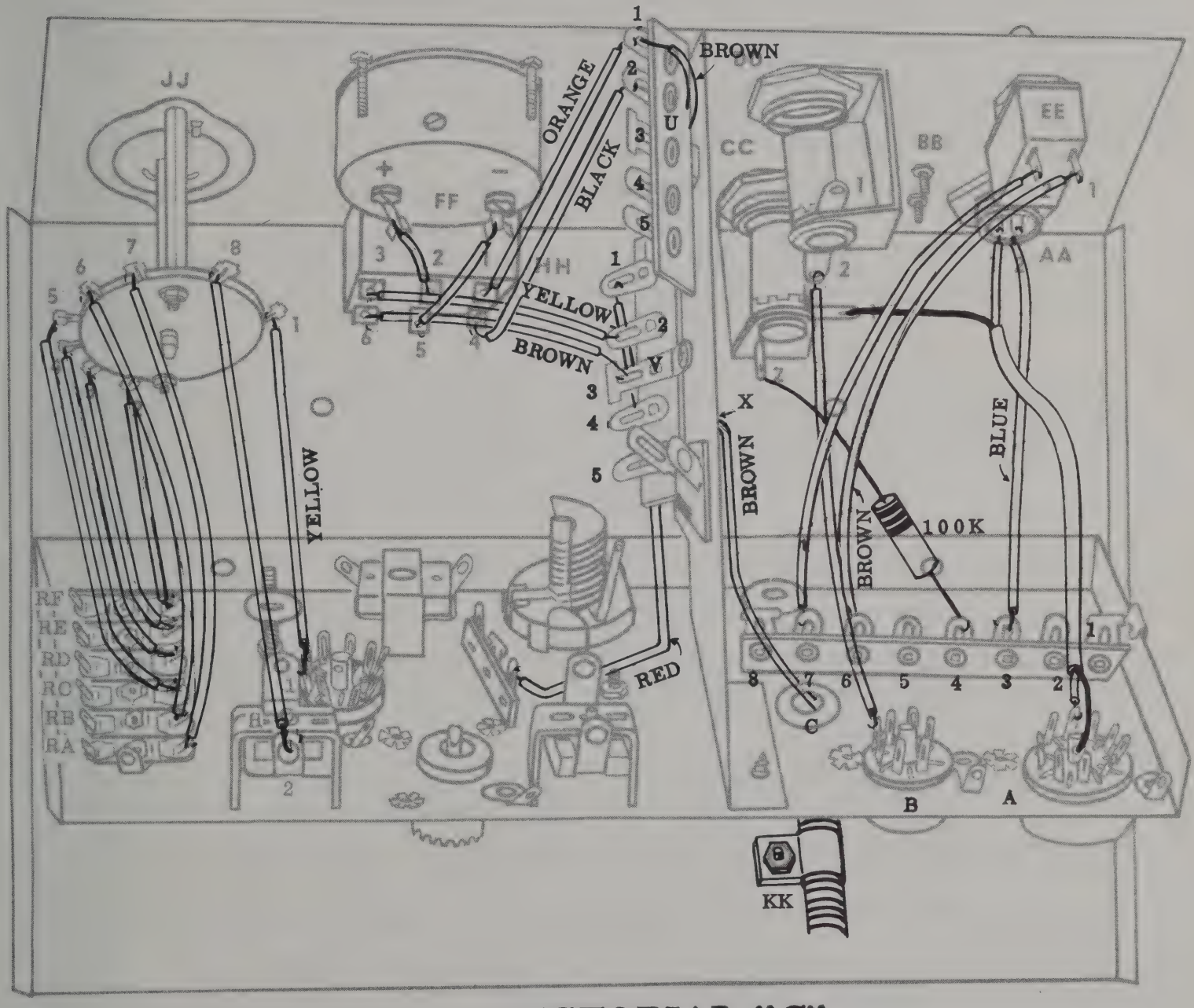
Strip both ends of a 4" piece of BLACK wire and connect one end to switch "HH" lug 4 (solder 1). Dress the wire straight up toward the meter and leave the other end free.

Strip both ends of a 4" piece of **BROWN** wire and connect one end to switch "HH" lug 6 (solder 1). Dress the wire to the right between the two rows of lugs and straight up toward the meter and leave the other end free.

Strip both ends of a 4" piece of **ORANGE** wire and connect one end to switch "HH" lug 1 (solder 1). Dress this wire straight up toward the meter and leave the other end free.

Strip both ends of a 4" piece of **YELLOW** wire and connect one end to switch "HH" lug 1 (solder 1). Dress this wire to the right between the two rows of lugs, then up toward the meter, and leave the other end free.

For the following steps, refer to Pictorial "C".



PICTORIAL "C"

Place the main chassis and bracket inside the panel vertically as shown in Pictorial "C", but do not fasten as yet.

Connect the BROWN wire from switch "HH" lug 6 to terminal strip "V" on the bracket, lug 3 (solder 2).

Connect the YELLOW wire from switch "HH" lug 3 to terminal strip "V" lug 2 (solder 3).

Connect the BLACK wire from switch "HH" lug 4 to terminal strip "U" lug 2 (solder 2).

Connect the ORANGE wire from switch "HH" lug 1 to terminal strip "U" lug 1 (solder 3).

Now place the chassis carefully in position so that the three holes on the bottom lip align with the three matching holes in the bottom of the panel. Fasten in place with two sheet metal screws in the outside two holes. In the center mounting hole, insert the point of a probe, and push aside any wires that may appear in this hole. Now fasten with the third sheet metal screw.

Inside the panel dress the BLUE wire coming from socket "AA", on the panel, straight down to the panel bottom. Run flat against the bottom back towards the chassis and then straight up and connect to terminal strip "D" lug 3 (solder 3).

Connect the free end of the 100 K ohm resistor from socket "CC"lug 2 to terminal strip "D" lug 4 (solder 4). Make sure that solder flows over all wires connected to this terminal.

Connect the BROWN wire coming from tube socket "B" lug 4 to pilot light socket "DD" lug 2 (solder 1). This lug should be bent so as not to touch the shield bracket.

Cut the shielded cable coming from mike socket "AA" to a length of 4" as measured from the socket. Strip 1" of jacket from this end of the cable, untwist the shield braid, and retwist to form a second lead. Cut the center conductor to a length of 1/2", strip back 1/4", and tin with solder. Also tin the twisted braid.

Connect the center conductor lead of this cable to tube socket "A" lug 2 (solder 2). Bend and insert the shield braid lead into the center pin of tube socket "A" (solder 2). Dress the cable neatly down to the panel bottom and straight up to the socket. Make sure that the shield braid at either end does not short to the center conductor terminal, and that excess heat has not melted the plastic insulation of the center conductor where it emerges from the outer jacket.

Connect the heavy lead covered with sleeving from terminal strip "D" lug 6 to switch "EE" lug 1 (solder 1).

Connect the other heavy lead from terminal strip "D" lug 7 to switch "EE" lug 2 (solder 1).

Identify the YELLOW lead coming from tube socket "N" lug 2. Cut this lead 1/4" past lug 1 on switch "JJ". Strip back 1/4" and connect to "JJ-1" (solder 1).

Run a piece of bare wire through lug 2 on switch "JJ", and just into the hole in lug 2 of crystal socket "RF". Solder "RF-2". It will not be necessary to crimp this lead around the lug first, but make sure the end of the bare wire does not extend through the socket hole enough to touch the chassis. Pull the lead taut and solder "JJ-2". Make sure this bare wire does not touch the mounting screw or nut on the switch wafer.

In the same manner, connect a length of bare wire from switch "JJ" lug 3 (solder 1) to crystal socket "RE" lug 2 (solder 1). Pull taut and observe the same precautions as above.

In the same manner, connect a length of bare wire from switch "JJ" lug 4 (solder 1) to crystal socket "RD" lug 2 (solder 1).

Similarly, connect a length of bare wire from lug 5 on switch "JJ" (solder 1) to crystal socket "RC" lug 2 (solder 1).

In the same manner, connect a length of bare wire from lug 6 on switch "JJ" (solder 1) to crystal socket "RB" lug 2 (solder 1).

Similarly, connect another length of bare wire from lug 7 on switch "JJ" (solder 1) to crystal socket "RA" lug 2 (solder 1).

Pass a length of bare wire down through lug 2 on trimmer "H" and into lug 8 on switch "JJ". Crimp around "JJ-8" and (solder 1). Cut off excess, crimp around "H-2" and (solder 2).

Slip the cable clamp over the 6 conductor cable coming from the chassis and align over hole "KK" in the bottom plate. Insert a 6-32 x 3/8" screw through the hole from below, through the two holes in the cable clamp, and fasten with a 6-32 nut and lockwasher.

Now, strip 2" of the outer jacket from the free end of the cable. Use care so as not to damage the inner conductors or the shield braid. Untwist the shield braid and cut off half the strands close to the jacket end. Retwist the remaining strands tightly to form an additional lead. Strip 1" of insulation from each of the six conductors, twist tight, and tin each with solder. Also lightly tin the shield braid lead. Feed the cable end into the octal plug cover, first passing the cable through the clamp or grommeted hole.

Notice that each pin in the octal plug is numbered on the side of the plug away from the metal pins (this is the side with the recessed holes). Insert the stripped end of the BLACK wire into hole #2, pushing the wire into the pin until the insulation on the wire rests in the recessed hole.

Solder pin #2. This can be most easily done by arranging to hold the cable in a vise or makeshift holder so that the octal plug points with its pins straight upwards. Then take a CLEAN soldering iron, with no solder blobs on its tip, and hold it against the side of the pin, near the bakelite body of the plug. As soon as the pin has become sufficiently heated, feed a little solder into the hole at the end of the pin. If the pin is hot enough, the solder will flow down into the pin, without flowing down the outside of the pin. It is important to keep the solder off the outside of the pin, so that the plug will insert into its socket without binding. If solder does flow outside, wipe off with a small rag while the pin is still hot. Work slowly and carefully, and you will have no difficulty.

Insert the WHITE wire into hole #3 as before and solder.

Insert the BLUE wire into hole #5 and solder as before.

Insert the RED wire into hole #6 and solder as before.

Insert the BROWN wire into hole #7 and solder as before.

Insert the YELLOW wire into hole #1 and solder as before.

Insert the shield braid into hole #8 and solder.

Slide the cap back over the wire and snap into place over the plug. Push the plug against a hard surface, and line up the dimple in the cap with one of the slots in the plug. If the cap is positioned properly, a medium amount of pressure will snap it into place. If there is a clamp on the end of the plug, tighten securely to the cable.

On the mike connector plug, loosen the protruding set screw, and remove the spring. Insert the end of the microphone cable into the wider end of the spring, and open slightly the free end of the coil. While holding open, slide the shield braid of the mike cable between this open end and the next coil. Thread the braid two turns back into the coil and cut off about 1/4" from the coil.

Under the sliding cap of the connector, you will notice a flat screw head. Remove this screw and set aside carefully. From the back of the plug, push out the plastic plug insert. Now place the spring and cable assembly back into the end of the plug, push in as far as it will go, and retighten the protruding set screw.

Place the recessed end of the plug insert over the two stripped wires that appear through the front end of the plug, so that the RED lead goes through pin #2, and the WHITE lead goes through pin #1. These numbers are stamped on the plastic inside the recessed end.

Slide the plug insert back into the front end of the plug, and align the tapped hole in the insert with the hole under the sliding cover in the plug. Insert the small screw previously removed and tighten.

Carefully solder the leads into pins 1 and 2, and cut off excess wire close to the pin.

With a pair of pliers, rotate the shaft of the channel selector switch fully counter-clockwise. Back out the set screw in the knob and place the knob on the shaft so that the set screw bears on the flatted portion of the shaft. Tighten the screw Rotate the knob through all positions, and make sure that the white pointer line points to each of the circles in succession. It may be necessary to remove the knob and slightly readjust the switch by loosening, rotating slightly, and retightening the nut to secure best alignment.

Place the #1891 pilot lamp in the socket next to the word "POWER". Push in and give a half-turn to the right in order to seat it properly. Screw the RED jewel into the front of the socket.

- Insert an NE-51 lamp into the bottom socket, and screw the CLEAR jewel into the socket from the front.
- On the back of the chassis, insert the 12AX7 tube into socket "A". Place one of the larger shield caps over the socket and set firmly on the clip.
- Insert the 6AQ5 tube into socket "B", and cover with the smaller shield cap.
- Insert the 6CX8 tube into socket "N", and cover with the remaining shield cap.
- Insert the crystal in the top crystal socket "RA". On the front panel, rotate the selector knob fully counter clockwise.

This completes the assembly of your MODEL CT-1 TRANSMITTER. Check again for short circuits, solder blobs and excess wire clippings. Instructions for alignment and adjustment are given below. The top cover, handle bracket, and crystal bracket, with mounting hardware should be left over. These will be installed after the unit is fully adjusted.

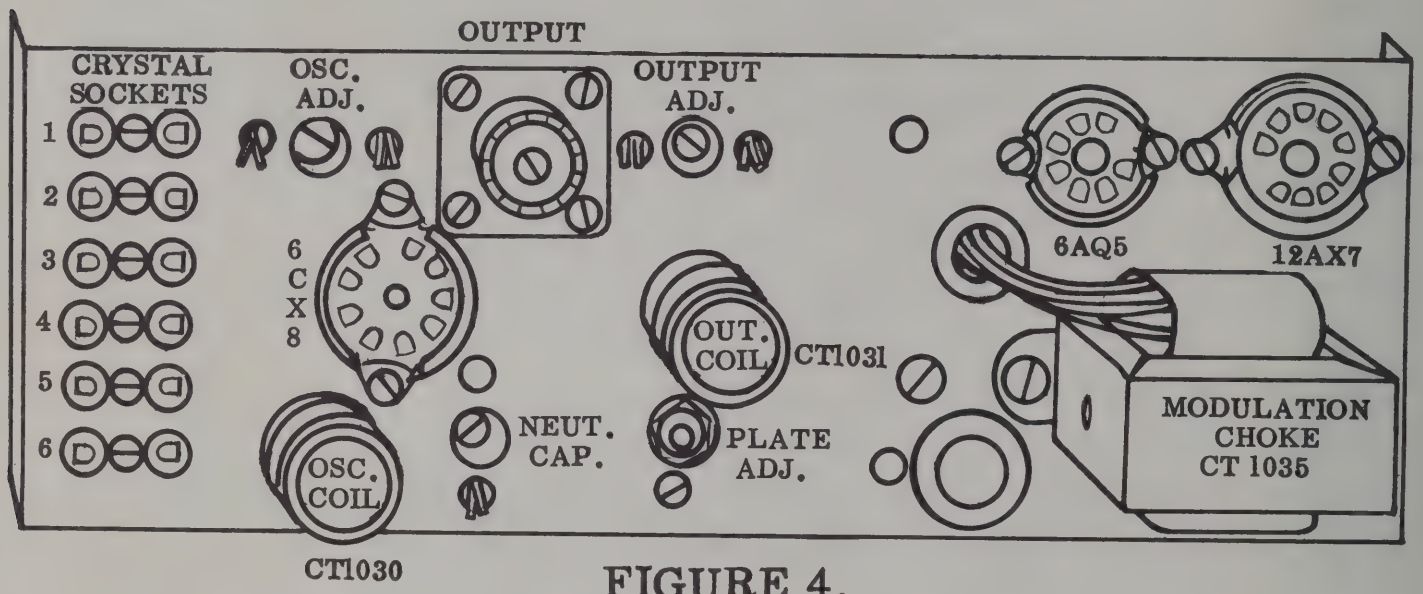
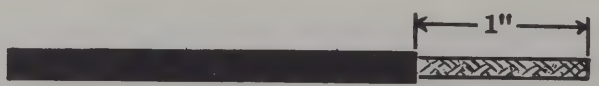


FIGURE 4.

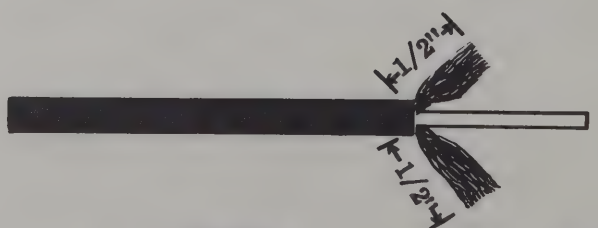
Prepare the length of 52 ohm co-axial cable on both ends, and attach UHF plugs to both ends as shown in Fig. 5. Work slowly, and follow the steps in Fig. 5 exactly, so that neat, loss-free connections are made.

FIGURE 5. METHOD OF ATTACHMENT OF CO-AXIAL CABLE TO UHF PLUG

1. Strip jacket back 1 inch.



2. Comb out braid. twist, and trim to 1/2 inch.



3. Feed on cover and bushing, and form braid.

(Figure 5 Continued on Next Page)

(Figure 5 Continued from Preceding Page)

4. Screw bushing and cable into plug.

5. Solder center pin and clip. Solder braid in holes.

6. Screw cover in place.

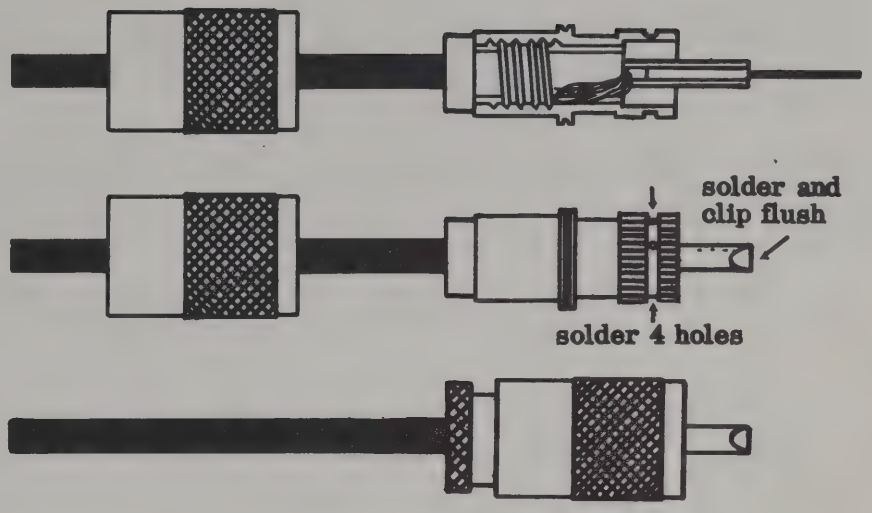


FIGURE 5.

SECTION IV

FINAL TESTS, ADJUSTMENTS AND CALIBRATION

The adjustments made in this section are required to properly align the Transmitter prior to putting it on the air. Under NO conditions should the unit be connected to an antenna and turned on unless authorization in the form of your license has been received from the F.C.C.

In order for the unit to operate, it is necessary that the proper power supply be available to provide operating voltages. Our models CPA-1 (for 110 volt fixed station use) and CPM-1 (for 12 volt mobile use) power supplies have been specifically designed for use with the CT-1 Transmitter, and their use is very strongly recommended. In the event that some other power supply must be used, the following voltages and switches must be available: Filaments - to provide 12.6 volts, AC or DC at 2 ampere current drain; High Voltage - to provide 300 volts D.C., well filtered, at 85 milliampere current drain (this voltage should not be exceeded by more than 5% at full drain, or the unit will be in excess of the legal 5 watt input power limitations, and the life of the tubes and components will be considerably shortened); Power Switching - primary circuit of the supply to be broken for insertion of power switch on CT-1; B plus Switching - relay operated from mike push-to-talk switch on CT-1 to key B plus into unit when activated. Connections from such power supply should be made to the octal power plug in accordance with the schematic diagram. The connections are automatically made when either the CPA-1 or CPM-1 power supplies are used.

For test purposes, it is also recommended that a good dummy load be used for proper adjustment of the output. The Model FS-1 Field Strength Meter and Load Box is an excellent unit for this purpose, since a directly metered reading of actual output power is provided, along with accurately calibrated loads. In lieu of using this meter, one of two alternatives can be used. As the first alternative, two 100 ohm, 2 watt 10% CARBON COMPOSITION resistors (available in radio parts supply houses) can be wired together in parallel (twist together and solder both pairs of leads separately), and this cpmbination temporarily soldered from the center pin to the rear bushing of the UHF plug on one end of the co-axial cable. This will provide a 50 ohm, 4 watt load, closely approximating usual Citizens Bands antennas. As a second alternative, a number 44 or 51 pilot lamp can be wired across the UHF plug on one end of the scale. This gives the advantage of a visual indication of RF output, but can easily be burnt out by excessive output or operation for too long a period with constant on and off switching of output. The impedance of these lamps is somewhat lower than that of standard antennas, and a trimming adjustment will have to be made when connecting to an actual antenna. In any of the three cases, the free end of the co-axial cable should be attached to the output socket on the CT-1.

Set the unit up in the following manner preliminary to testing: Cabinet off; Power plug in proper socket on power supply; co-axial cable and load connected to OUTPUT SOCKET; Microphone plugged into front panel socket; Crystal plugged in to top-most socket (#1 or "RA"). On the back of the chassis, make the the following preliminary adjustments: OSCILLATOR TRIMMER ADJ. Turn in snug with small screwdriver, and then back out two full turns. OUTPUT TRIMMER ADJ. -- Turn in snug with screwdriver, and then back out 3 full turns. NEUTRALIZING TRIMMER CAPACITOR -- Turn in snug, and back out 4 full turns. PLATE ADJ. CAPACITOR -- Make sure this capacitor is fully meshed then loosen the locking nut, and then turn the shaft 1/4 turn to the left (counter-clockwise). Leave the lock nut loose.

On the front panel, set the controls as follows: POWER SWITCH — to OFF. MICROPHONE -- plugged in to socket and screwed down snug. METER SWITCH -- set to "MODULATION OUTPUT". TRANSMIT CHANNEL SELECTOR -- turn fully to the left (counter-clockwise, to first position).

Start by taking a preliminary check of the high voltage circuits. An ohmmeter connected between lug #2 on terminal strip "D" and the chassis should read at least 100,000 ohms after 30 seconds to allow the de-coupling capacitor to charge. If this reading is considerably lower, check wiring of all circuits attached to "D-2" for shorts to ground or other lugs.

After attaching the power supply to the appropriate input voltage as outlined in the manual for the supply, turn the unit on with the POWER SWITCH. The red pilot lamp shoulg glow brightly at first, and then dim slightly as the filament warms up. Do not press the push-to-talk switch at this time. Inspect all tubes to be sure that filaments are lit. Alignment for maximum output into a dummy load should proceed as follows:

1. After allowing the unit to warm up for at least 5 minutes, press the push-to-talk switch, and hold down. The neon indicator next to the mike bracket should glow. This applies B plus to the unit for transmission.

2. Watch the meter of the FS-1 load or the dummy lamp for some indication of output. If using resistors as a load, the following procedure will be necessary, which can also be used simultaneously with the FS-1 or the lamp as an added indication:

Flip the METER SWITCH to PLATE INPUT POWER shortly before making the following adjustments, and then BACK TO THE OUTPUT POSITION immediately after the adjustment is completed. When adjustment is made that brings the pointer of the meter anywhere below "5" on the scale, the switch can then be left in the PLATE INPUT POWER position, and used as indicated. Before adjustment is obtained which loads the RF power amplifier to the proper range, the meter is slightly overloaded in the PLATE INPUT POWER position, and should be used only for very short periods. As an alternative, permitting the meter to be used at all times, a 1000 ohm, 1/2 watt resistor can be connected temporarily across the meter terminals, cutting its sensitivity in half, and keeping all readings on scale throughout the adjustments. This will fully protect the meter from possible damage, and give a much more consistent indication during adjustment. Be sure to remove the temporary shunt after completing adjustment.

3. Slowly turn the PLATE ADJ. CAPACITOR until a sharp rise in output is indicated. This should be within a quarter turn in either direction from the initial setting. This peak is quite sharp, and should be approached with care from both directions and then maximized. If no peak is obtained, return to the original setting, and proceed with the next step, then return to this step. The front panel meter will dip to minimum for this reading as an indication of rise in output.

4. Back OUT the OSCILLATOR TRIMMER ADJ. one full turn more, then IN slowly. A point will be reached at which the output rises sharply, and the cuts off abruptly (front panel meter dips sharply, and then rises). When the cut-off point is reached stop, and then back out slowly until output jumps abruptly up (meter dips on panel). Back out 1/8 turn more and leave set. Steps 3 and 4 are somewhat interdependent, and should be repeated in order two or three times for best output.

After getting best output indication in steps 3 and 4, adjust the OUTPUT TRIMMER ADJ. for maximum output. This adjustment is somewhat broad, but a definite maximum point will be found.

6. Neutralization of the unit will now be adjusted. Turn the PLATE ADJ. CAPACITOR within the half-turn range from full meshed to full open (do not turn beyond full open where plates begin to mesh again, as readings will be duplicated and add confusion). Over this range, TWO points should be found where output is indicated. CAREFULLY tune the capacitor for the higher output point, and set. Now back out the NEUTRALIZING TRIMMER CAPACITOR two more turns, and slowly IN until maximum output is obtained. Stop at this point, and re-adjust the PLATE ADJ. CAPACITOR to the other output point, and check to see if it is reduced in output. If not, turn the NEUTRALIZING TRIMMER in one half turn, and repeat the entire procedure. A point should finally be reached where one of the settings of the PLATE ADJ. gives maximum output, and the other peak is sharply reduced. Under no circumstances should adjustment have to be made where the NEUTRALIZING TRIMMER is turned fully in. The usual range of this setting, depending on lead dress of the unit and nature of load used, is from two to four turns out from snug in.

7. With the adjustments above properly made to indicate maximum output, switch the METER SWITCH to MODULATION-OUTPUT. Make sure that any shunt placed across the meter terminals is removed. Using an insulated screwdriver, adjust the METER TRIMMER on the shield plate until a reading is obtained at about "3" on the scale. This reading is relative, and the exact setting is not important. If a dummy lamp or resistors were used for load, rather than the model FS-1, re-adjust the OSCILLATOR TRIMMER, OUTPUT TRIMMER, AND PLATE ADJ. as outlined above for maximum reading on the meter in the MODULATION-OUTPUT position.

8. This completes the adjustment of the CT-1 for maximum output. With the push-to-talk switch down, speaking into the microphone should cause an increase in output, indicated variously by small fluctuations in the front panel meter in the OUTOUT-MODULATION position; an increase in the brightness of the dummy load lamp, and increasing reading on the FS-1 Field Strength Meter and Load Box. Modulation can

be checked in the FS-1 by the use of a high-impedance earphone plugged into the unit.

The front panel meter will read actual plate input power when switched to that position. At all times, this should be less than 5 watts, in order to stay within the legal limitation imposed by the F.C.C. The metering resistor is calibrated to 1%, and should give a total accuracy of reading with the meter tolerance of plus or minus 5%. A method is given below for accurate calculation of the actual plate input power for those desiring to verify readings.

1. Using a DC voltmeter (preferably a VTVM or 20,000 ohms/volt multimeter), record the voltage at pin 1 of terminal strip "U". Make sure the set is fully warmed up, and output is maximized into some dummy load as outlined above. This voltage should be taken with respect to the chassis, and should be around 300 volts D.C. Write down the voltage, and label it "E (in)".

2. Record the voltage on lug 1 of terminal strip "L" as "E (plate)". Be sure to use an insulated probe and do not short to any other lugs.

3. Record the voltage on lug 8 of socket "N" and "E (screen)". Be very careful not to short the probe to any other lugs, especially lug 9 of this socket.

4. Turn the unit off. If an ohmmeter is available, record the exact resistance between terminal strip "U", lug 1 and terminal strip "V", lug 1, as "R (plate)". If this can not be measured, take the value as 3,000 ohms.

5. Record the exact resistance between lug 1 of terminal strip "L" and lug 8 of socket "N", as "R (screen)". If this can not be measured, take the value as 10,000 ohms.

6. The first calculation is for total tube current "I (total)". Using Ohms law, this is given by:

$$\text{I (total)} = \frac{\text{E (in)} - \text{E (plate)}}{\text{R (plate)} \times .001} = \text{milliamps}$$

Assuming values of "E (in)" as 300 volts: "E (plate)" as 210 volts; and "R (plate)" as 3,000 ohms:

$$\text{I (total)} = \frac{(300) - (210)}{(3,000) \times .001} = \frac{(90)}{(3)} = 30 \text{ milliamps}$$

7. Next, total screen-circuit current is calculated. This is given, also by Ohms law, by the equation:

$$\text{I (screen)} = \frac{\text{E (plate)} - \text{E (screen)}}{\text{R (screen)} \times .001} = \text{milliamps}$$

Assuming values of "E (plate)" as 210 volts; "E (screen)" as 140 volts; and "R (screen)" as 10,000 ohms:

$$\text{I (screen)} = \frac{(210) - (140)}{(10,000) \times .001} = \frac{(70)}{(10)} = 7 \text{ milliamps}$$

8. Actual plate current is given by: $\text{I (plate)} = \text{I (total)} - \text{I (screen)}$

From the values arrived at above:

$$\text{I (plate)} = 30 \text{ milliamps} - 7 \text{ milliamps} = 23 \text{ milliamps}$$

9. True plate input power is now arrived at by the equation:

$$\text{P (plate)} = \text{I (plate)} \times \text{E (plate)} \times .001 = \text{watts}$$

From the above values:

$$\text{P (plate)} = (23 \text{ milliamps}) \times (210 \text{ volts}) \times .001 = 4.83 \text{ watts}$$

You have now gone as far as possible in adjustment of the transmitter without an antenna. When authorization to transmit is received from the F.C.C. in the form of your license, you may peak the unit into the antenna. This can be accomplished by plugging the antenna lead into the output socket, and turning the unit on. When warmed up, select OUTPUT-MODULATION on the meter switch, and peak the OUTPUT TRIMMER ADJ. for maximum reading on the meter. This adjustment in no way affects operating frequency, but only matches the output network to the impedance of the antenna, and is thus within the legal range of adjustments

allowed by the F.C.C. At this time, lock the nut on the PLATE ADJ. CAPACITOR so that it will not rotate.

Decide at this time if you desire additional crystals for the unit. Remember that frequency tolerance of the unit is NOT GUARANTEED unless crystals made specifically for this unit are purchased from your supplier who will be able to obtain them for you from Philmore Mfg. Co. Be sure to specify crystals for the PHILMORE MODEL CT-1 TRANSMITTER. We have provided one crystal for operation on channel 12, but the choice of additional frequencies is up to you. The actual frequencies chosen depends upon local band conditions and crowding. If you are not familiar with these, your supplier will gladly give you information concerning the best choice for your area. When these crystals are purchased, install them in the sockets in ASCENDING ORDER of frequency, with the lowest channel in socket "1" (RA) and the highest in socket "6" (RF) if a total of 6 crystals is used. After installation of the crystals, attach the crystal bracket provided over them to prevent loss. The short leg of the bracket attaches to the main chassis with a sheet-metal screw in the hole just above the crystal sockets. Fasten the other end in the hole in the bottom plate, with a sheet-metal screw passed up from the bottom. If the crystals purchased are widely separated on the Citizens Band, it may be necessary to re-adjust the unit to a compromise maximum output for the crystal nearest the center of the spread of frequencies, usually the channel 12 crystal originally provided. Make sure that the OSCILLATOR TRIMMER ADJ. is set so that some output is obtained for each crystal switched in by the TRANSMIT CHANNEL SELECTOR. Peak the unit for the best possible compromise of maximum output for all the crystals installed.

Fill out the TRANSMITTER IDENTIFICATION CARD included. Cut it off the main sheet, remove the protective backing, and attach it to the side of the cabinet cover. Remember that this card is not and may not be used as a license, but only indicates that you have obtained your license and authorization to use your transmitter.

Cut out the numbers and letters that constitute your call sign with a single-edge razor blade, remove the backing, and neatly place them in the space provided on the front panel. Smooth each as it is put on with the fingernail.

Place a channel identifying number for each crystal installed in the circles on the front panel for the TRANSMIT CHANNEL switch. The lowest channel number (socket RA) is to the left, and the numbers go clockwise in increasing order. The chart below will help identify channel numbers according to frequency of the crystal.

CHANNEL	FREQ. (MC)	CHANNEL	FREQ. (MC)	CHANNEL	FREQ. (MC)
1	26.965	8	27.055	15	27.135
2	26.975	9	27.065	16	27.155
3	26.985	10	27.075	17	27.165
4	27.005	11	27.085	18	27.175
5	27.015	12	27.105	19	27.185
6	27.025	13	27.115	20	27.205
7	27.035	14	27.125	21	27.215
				22	27.225

Now install the cabinet over the unit. Slip the cover in place, and attach on each side with two metal screws in the mounting holes near the bottom edge. Place the handle bracket on top of the cabinet, so that it slopes toward the front panel. If it is desired to use the handle bracket as a tilt table stand, place over the bottom plate, so that it slopes toward the front panel. Slip a large flat metal washer between the handle and the side of the cabinet, and insert a knurled thumbscrew through both the handle and the washer, and thread into the matching hole on the side of the cabinet. Repeat on the other side of the cabinet. After the handle is set, tighten the thumbscrews securely. If the unit is to be mounted in the vehicle, install the handle bracket first under the dashboard with the large bolts through the larger holes in the bracket. Then slide the CT-1 up into the handle bracket, and fasten as above. The smaller holes in the handle bracket mate with holes in the bottom plate of our model CC-1 Converter, in the event it is desired to hang the Transmitter below the Converter under the dashboard. Conversely, two holes in the bottom plate of the Transmitter mate with holes in the handle bracket of the Converter in the event it is desired to hang the Converter below the Transmitter.

SECTION V

SERVICE AND REPAIR

The PHILMORE MANUFACTURING CO. makes every effort to supply only the finest of components that undergo rigorous factory tests before shipment. Despite these controls, it sometimes occurs that a defective part or tube appears in a kit assembly. More often, however, improper operation can be traced to incorrect wiring or the use of the wrong parts in certain connections. General service procedure calls for re-inspection and tracing of the wiring, and re-evaluation of color-coded components before beginning instrument testing. Once you are certain that all assembly instructions have been followed exactly, the next

step consists of taking a set of voltage readings at the tube terminals. These should be compared with those given in the accompanying table. Variations from given voltages, up to plus or minus 20%, should not affect the operation of the equipment seriously.

VOLTAGE CHART

MODEL CT-1

Readings taken with the Vacuum Tube Voltmeter or 20,000 ohms/volt meter. All voltages are positive D.C. measured to chassis unless otherwise noted.

Controls set as follows:

POWER SWITCH - On
MICROPHONE - Push-to-talk switch on
METER SWITCH - To PLATE INPUT POWER
CHANNEL SWITCH - To Channel 12
OUTPUT - Peaked to 52 ohm dummy load in Model FS-1 Load Box
INPUT - Pin 1 of mike socket shorted to ground with clip lead

Readings taken with Model CPA-1 power supply, 117 volts, 60 cycle AC input. Voltages (*) noted are for CPM-1 mobile power supply, 12 to 14 volt D.C. input.

Readings noted in parenthesis ( ) are to be taken with a 2.5 millihenry RF choke in series with the meter probe to prevent loading.

Readings preceded with minus sign (-) are negative to ground.

TUBE OR TERMINAL STRIP	LUG NUMBER								
	1	2	3	4	5	6	7	8	9
12AX7	160	0	1.45	13AC 13*	0	100	-0.7	0	-
6AQ5	0.2	20	0	7AC 6.5*	300	310	0.2	-	-
6CX8	0	-8.5	(155)	7AC 6.5*	13AC 13*	0	(-10)	150	Do not Read

ALL READINGS CAN VARY PLUS OR MINUS 20% AT MAXIMUM
READINGS LESS THAN 1 VOLT ARE NOT SIGNIFICANT

Parts Replacement

If testing reveals a defective component, and if this defect has not been caused by improper handling on the part of the purchaser, the PHILMORE MANUFACTURING CO. will gladly replace the component if the following conditions are fulfilled: identify the part by part number as listed in this instruction book and state the type and model of the equipment for which the component is required. In your letter, refer to the date of purchase and the dealer from whom the kit was bought, in addition to complete details relative to the defect in the components.

In all cases, return the defective part POSTAGE PREPAID and carefully packaged to avoid breakage in transit.

Service

In extreme cases, where the equipment cannot be made operative by the kit builder, the PHILMORE MANUFACTURING CO. will undertake to provide the necessary service under the conditions outlined below.

Equipment will be serviced only if it has been completely assembled in accordance with the instructions contained in this manual. Equipment that has been constructed in any other manner, that has been modified in any way, that has been wired with acid core solder or soldering paste of any type, or that is incompletely assembled will be shipped back to the sender collect.

A minimum service charge of $5.00 will be made to the sender, plus the cost of replacement parts if they are required. This offer is valid only for equipment purchased one year or less before shipment for ser-

vice is made. No money should be sent with the equipment. After repairs have been effected, PHILMORE MANUFACTURING CO., INC. will bill the sender in full. Upon receipt of payment, the equipment will be shipped back by the company.

Shipping Instructions

(1) Obtain a tag intended for express shipment and enter your name, address, and trouble symptoms on the tag. Attach the tag to the body of the instrument itself, not to the carton or package.

(2) Be certain that all equipment components are securely mounted on the chassis in the positions given in this manual.

(3) The carton in which the kit is sold is NOT SUITABLE FOR SHIPMENT BACK TO THE FACTORY. The container must be rugged and oversized to permit the use of generous layers of padding material such as shredded newspaper, excelsior, or styrofoam. Allow room for at 3-1/2" of padding on all sides and bottom of carton.

(4) Ship to PHILMORE MANUFACTURING CO., INC., 130-01 Jamaica Avenue, Richmond Hill 18, N.Y. express prepaid.

The Philmore Manufacturing Co., Inc. guarantees each new radio or electronic product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service disclosed such defect provided the item is returned to us intact, for our examination, with all transportation charges prepaid to our factory, within ninety days from the date of shipment and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio or electronic products which have been subject to misuse, neglect, accident, improper wiring in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory.

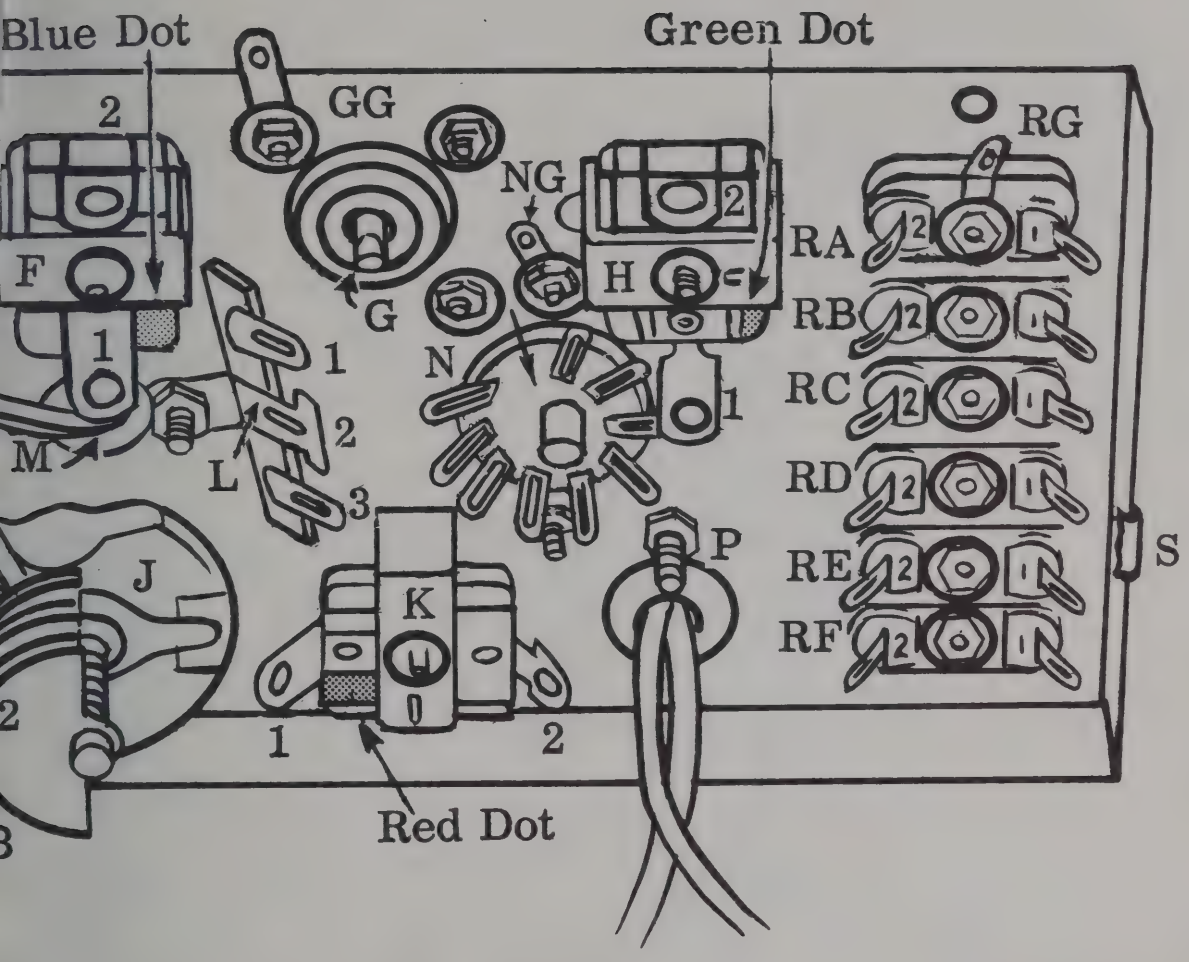
We are not responsible for damage that occurs in transit. The consignee must file claims for recovery with the carrier. We reserve the right to change instrument specifications at any time without being obliged to modify existing instruments or those already sold in like manner.

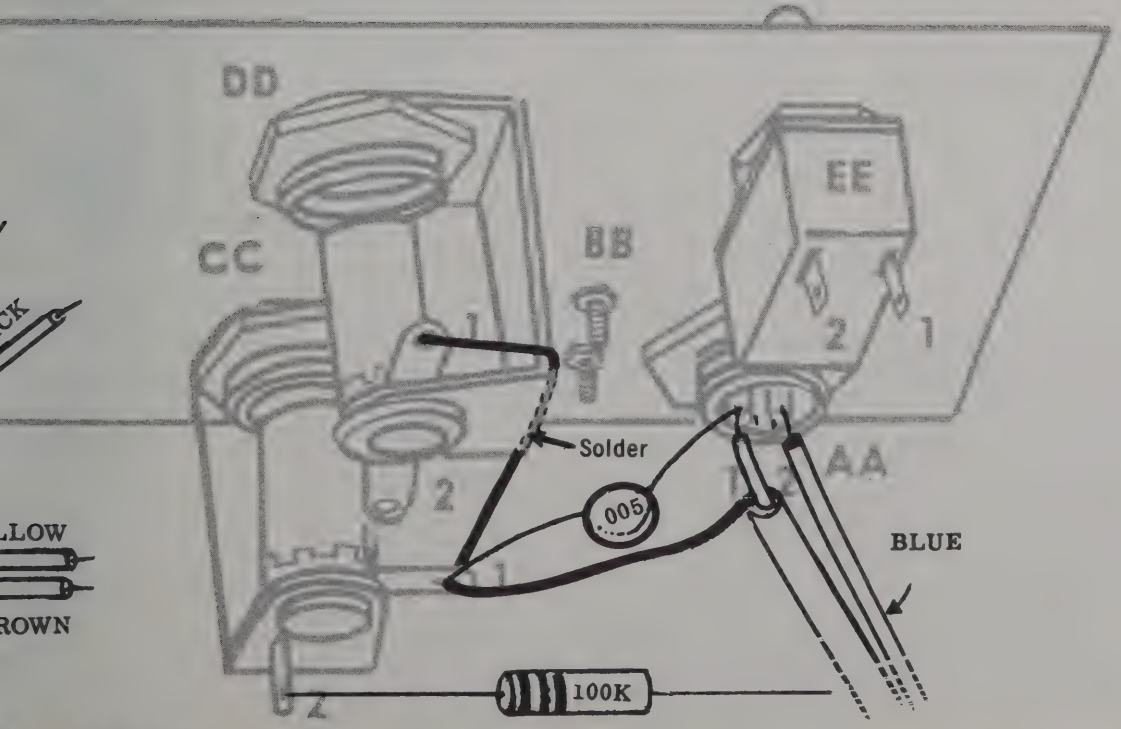
PARTS LIST

MODEL CT-1 TRANSMITTER

PART #	QUAN.	DESCRIPTION
Resistors:		
CT1001	1	470 ohm, 1 W
CT1003	1	3.3 K ohm, 1/2 W
CT1004	2	10 K ohm, 1/2 W
CT1005	1	10 K ohm, 1 W
CT1006	1	33 K ohm, 1 W
CT1007	1	100 K ohm, 1/2 W
CT1008	1	39 K ohm, 1/2 W
CT1009	3	270 K ohm, 1/2 W
CT1010	1	470 K ohm, 1/2 W
CT1011	1	1 M ohm, 1/2 W
CT1012	1	1.8 M ohm, 1%
CT1013	1	10 M ohm, 1/2 W
CT1014	1	3 K ohm, W.W.

PART #	QUAN.	DESCRIPTION
Capacitors:		
CT1015	1	10MMFD disc
CT1016	1	680 MMFD disc
CT1017	7	.001 MFD disc
CT1018	3	.001 MFD1 KV disc
CT1019	2	.005 MFD disc
CT1020	2	.01 MFD disc, 1 KV
CT1021	1	10 MFD, 25 V. Lytic
CT1022	1	10MFD, 300 V. Lytic
CT1023	1	30 MFD, 25 V Lytic
CT1024	1	1.5-15 Trimmer (red)
CT1025	2	3-35 Trimmer (green)
CT1026	1	500-1000 Trimmer (blue)
CT1028	1	5-50 Air padder


Blue Dot
Green Dot
GG
NG
RG
RA
RB
RC
RD
RE
RF
F
H
G
N
M
L
J
K
P
S
Red Dot


DD
EE
CC
BB
AA
Solder
.005
BLUE
100K

vice is made. No money should be sent with the equipment. After repairs have been effected, PHILMORE MANUFACTURING CO., INC. will bill the sender in full. Upon receipt of payment, the equipment will be shipped back by the company.

Shipping Instructions

(1) Obtain a tag intended for express shipment and enter your name, address, and trouble symptoms on the tag. Attach the tag to the body of the instrument itself, not to the carton or package.

(2) Be certain that all equipment components are securely mounted on the chassis in the positions given in this manual.

(3) The carton in which the kit is sold is NOT SUITABLE FOR SHIPMENT BACK TO THE FACTORY. The container must be rugged and oversized to permit the use of generous layers of padding material such as shredded newspaper, excelsior, or styrofoam. Allow room for at 3-1/2" of padding on all sides and bottom of carton.

(4) Ship to PHILMORE MANUFACTURING CO., INC., 130-01 Jamaica Avenue, Richmond Hill 18, N.Y. express prepaid.

The Philmore Manufacturing Co., Inc. guarantees each new radio or electronic product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service disclosed such defect provided the item is returned to us intact, for our examination, with all transportation charges prepaid to our factory, within ninety days from the date of shipment and provided that such examination discloses in our judgment that it is thus defective.

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CT1014	1	3 K ohm, W.W.

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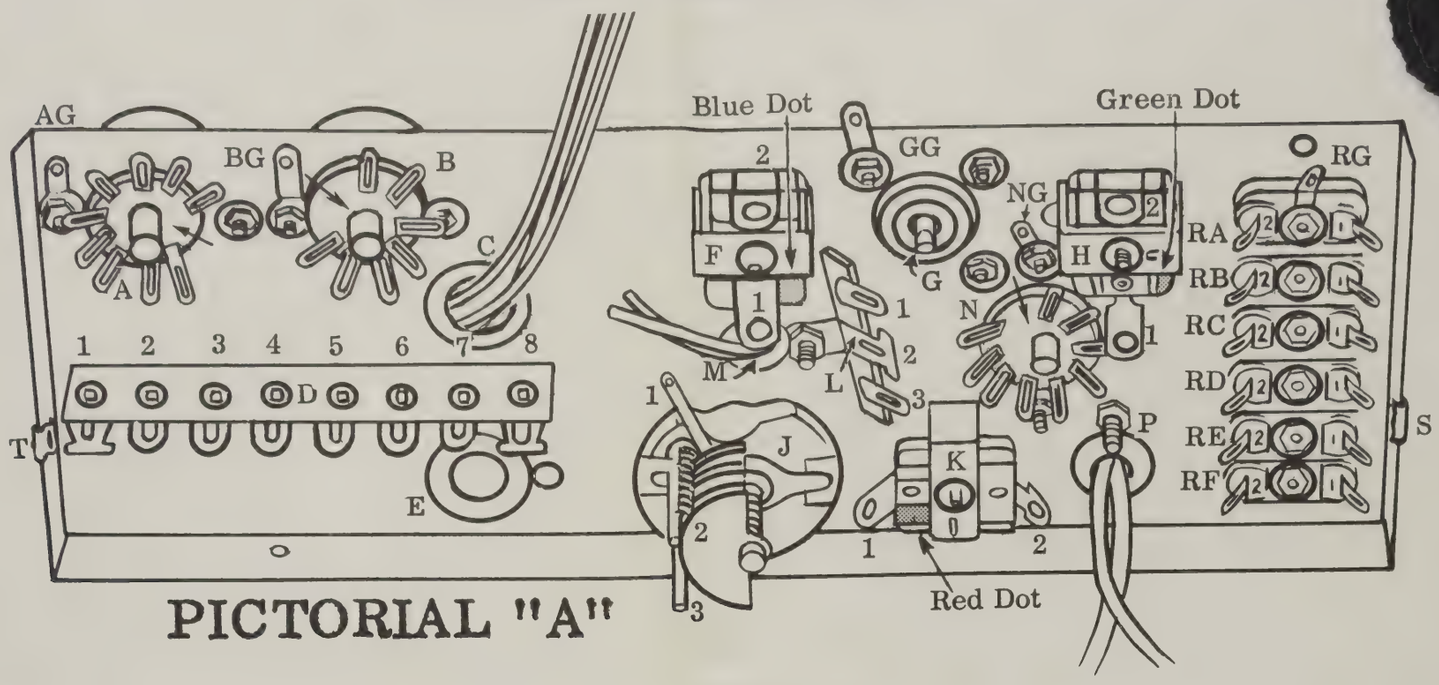
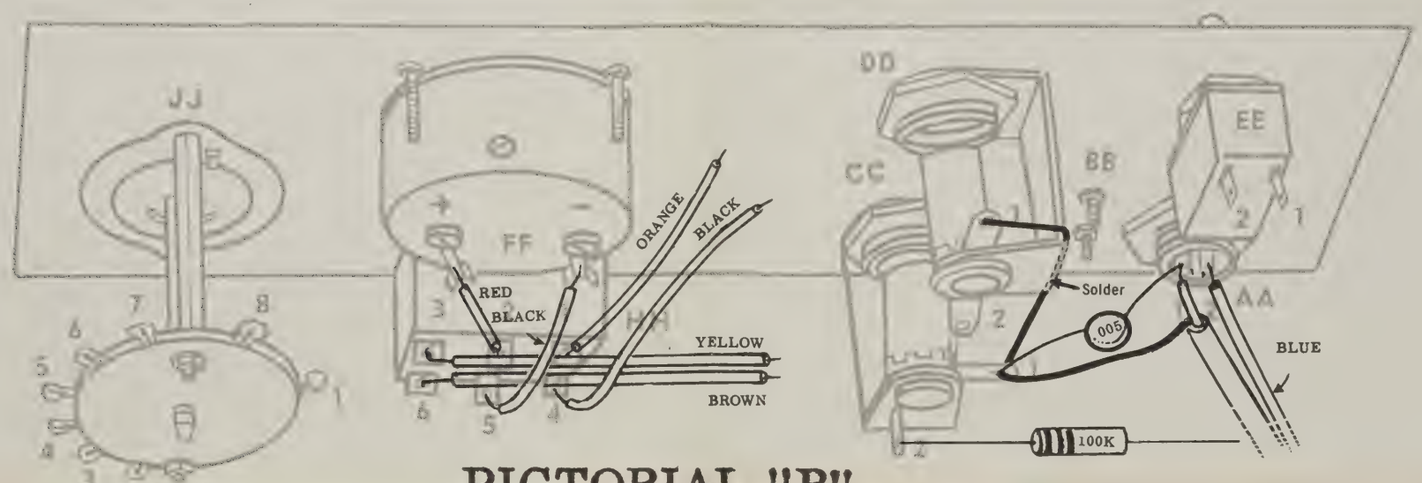
CT1025	2	3-35 Trimmer (green)
CT1026	1	500-1000 Trimmer (blue)
CT1028	1	5-50 Air padder



PICTORIAL "A"



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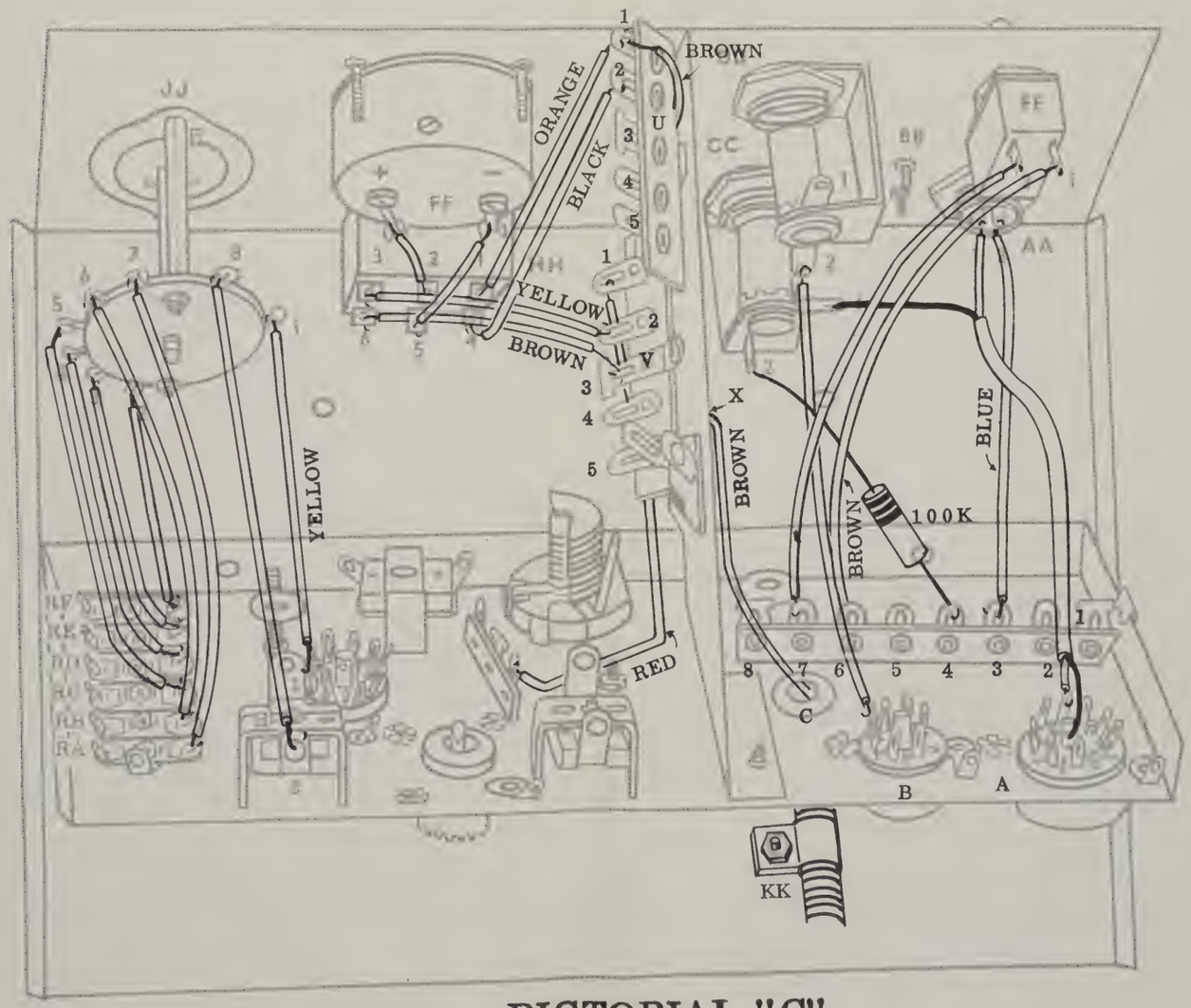

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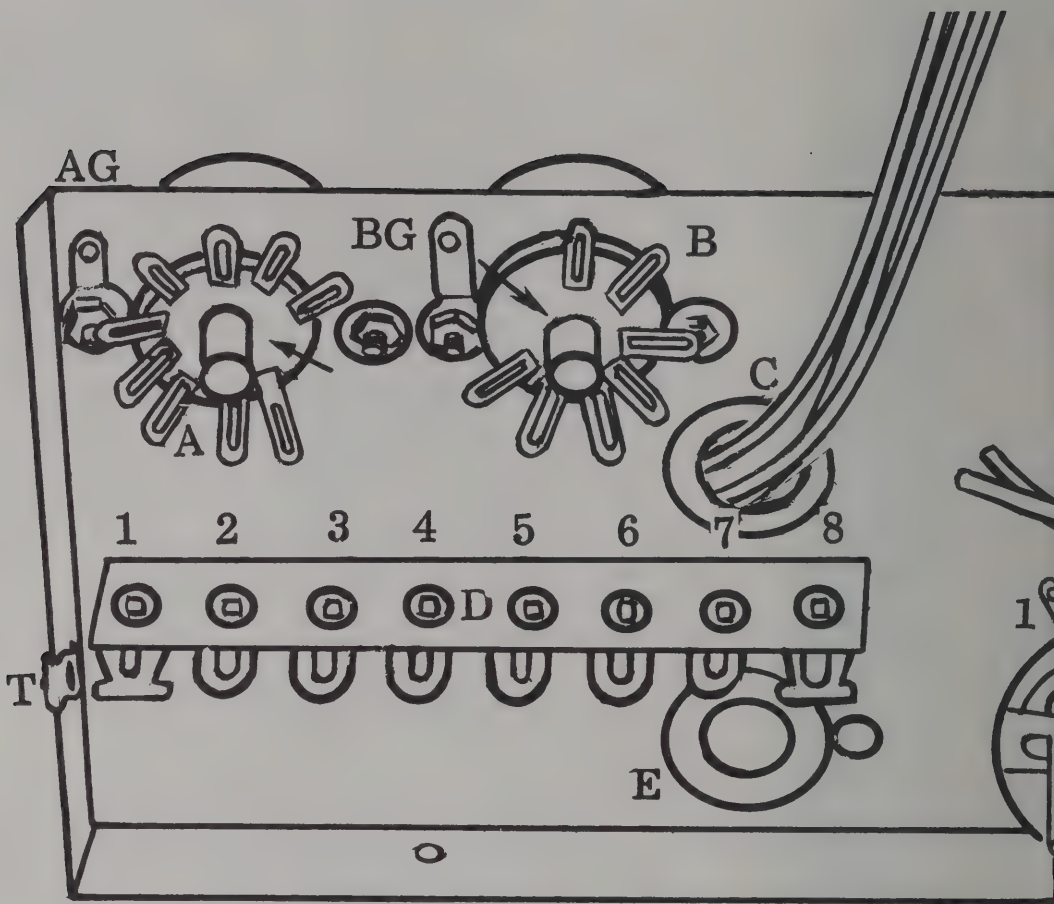
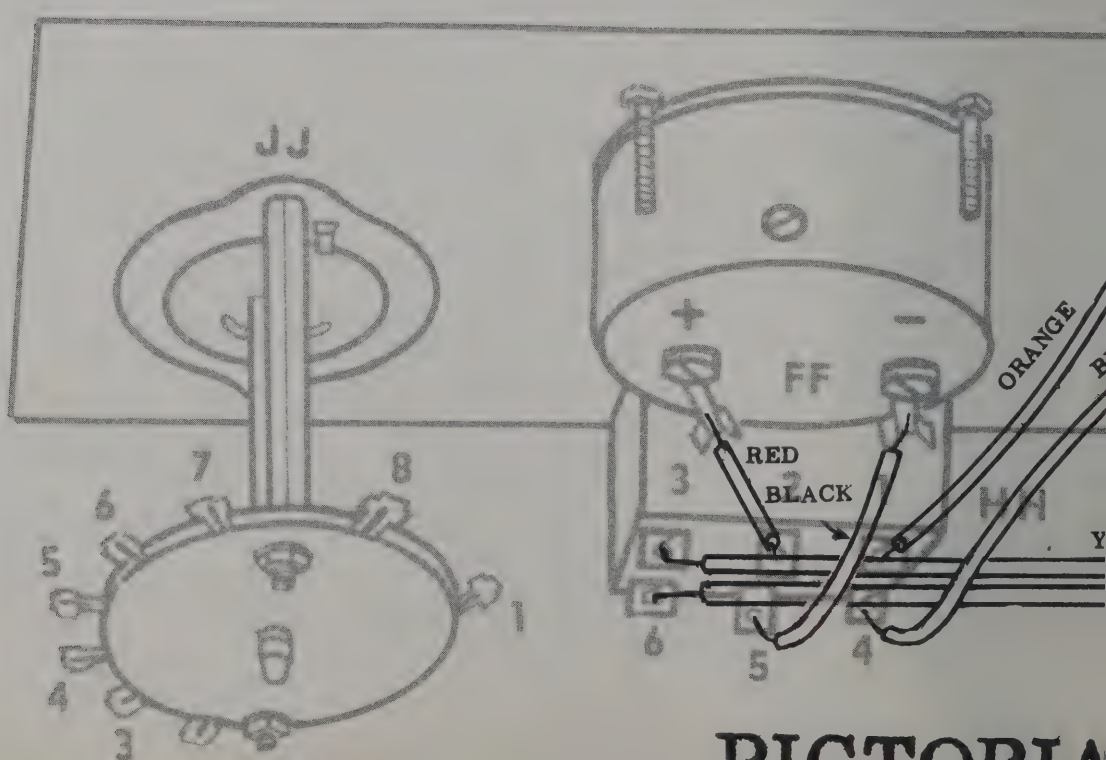


PICTORIAL "A"



PICTORIA

PART #	QUAN.	DESCRIPTION
Coils:		
CT1030	1	Osc. coil
CT1031	1	Output coil
CT1032	1	Meter coil
CT1033	1	2.2 UH RF choke
Chokes:		
CT1035	1	Modulation choke
Tubes:		
CT1036	1	12AX7 tube
CT1037	1	6AQ5A tube
CT1038	1	6CX8 tube
CT1039	1	#1891 lamp
CT1040	1	NE-51 lamp
Crystal and Diode:		
CT1034	1	1N34A diode
CT1041	1	27.105 MC crystal
Microphone:		
CT1042	1	Ceramic Mike w/switch
CT1043	1	Hang-up bracket
Meter:		
CT1044	1	50 UA panel meter
Switches:		
CT1045	1	SPST toggle switch
CT1046	1	DPDT toggle switch
CT1047	1	Rotary sel. switch
Sockets:		
CT1049	1	7 pin min. tube
CT1050	2	9 pin min. tube
CT1051	6	Crystal sockets
CT1052	1	UHF socket SO-239
CT1053	1	Red pilot light
CT1054	1	Clear pilot light
CT1055	1	Mike connector socket
Shields:		
CT1057	1	7 pin tube shield
CT1058	2	9 pin tube shield
Plugs:		
CT1059	2	UHF plugs, PL-259
CT1060	1	Octal power plug & cap
CT1061	1	Microphone plug
CT1056	2	Reducing bushing UG-175/U
Knobs:		
CT1062	1	Black knob w/pointer line
Metal Work:		
CT1063	1	Main chassis
CT1064	1	Panel and bottom
CT1065	1	Shield bracket
CT1066	1	Cabinet cover
CT1067	1	Crystal bracket
CT1069	1	Handle bracket

PART #	QUAN.	DESCRIPTION
Grommets:		
CT1071	1	3/8"ID x 7/16" mtg
CT1072	1	1/4"ID x 3/8" mtg
CT1070	1	1/8" I.D. x 1/4" Mtg.
CT1076	2	7/32"ID x 11 /32" mtg
Terminal Strips:		
CT1073	1	8 lug strip
CT1074	1	3 lug strip
CT1075	2	5 lug strips
Wire and Cable:		
CT1077	1 ft	Shielded 1 cond.
CT1078	1 ft	Sleeving for wire
CT1079A	1 ft	Black wire
CT1079B	3 ft	Brown wire
CT1079C	2 ft	Red wire
CT1079D	1 ft	Orange wire
CT1079E	1 ft	Yellow wire
CT1079F	1 ft	Blue wire
CT1080	3 ft	Bare wire
CT1081	5 ft	6 cond. power cable
CT1088	5 ft	RG-58/U co-ax cable
Screws;		
CT1082	10	4-36 x 1/4 BHMS
CT1083	7	6-32 x 3/8 BHMS
CT1084	6	4-36 x 3/8 BHMS
CT1085	9	#6 x 1/4 PK
CT1086	2	4-40 x 1/4 RHMS
CT1087	2	6-32 x 1/2 Knurl
Nuts:		
CT1089	16	4-36 x 3/16 Hex
CT1090	11	6-32 x 1/4 Hex
CT1091	2	J clips
CT1092	1	3/8 x 32 Control Hex
Washers, Lugs, Clamp:		
CT1093	2	#8 ID, 3/4 OD Flat washer
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CT1095	11	#4 Int. tooth Lockwasher
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Printed Matter:		
CT1100	1	Instruction Manual
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CT1107	1	Adhesive-back sheet
505(FCC)	1	License Form
77548	1	FCC Notice
78135	1	Order form for Part 19
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Misc. poly bags and small packing boxes large packing carton and filler.

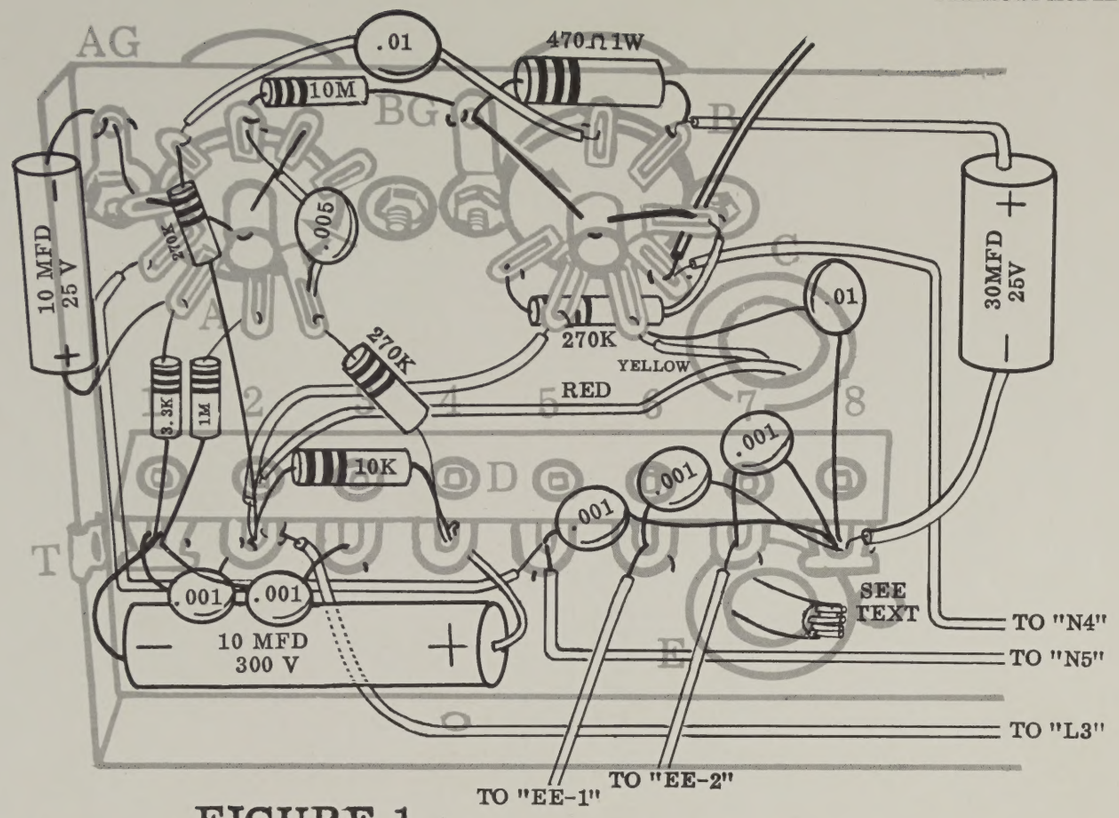


FIGURE 1.

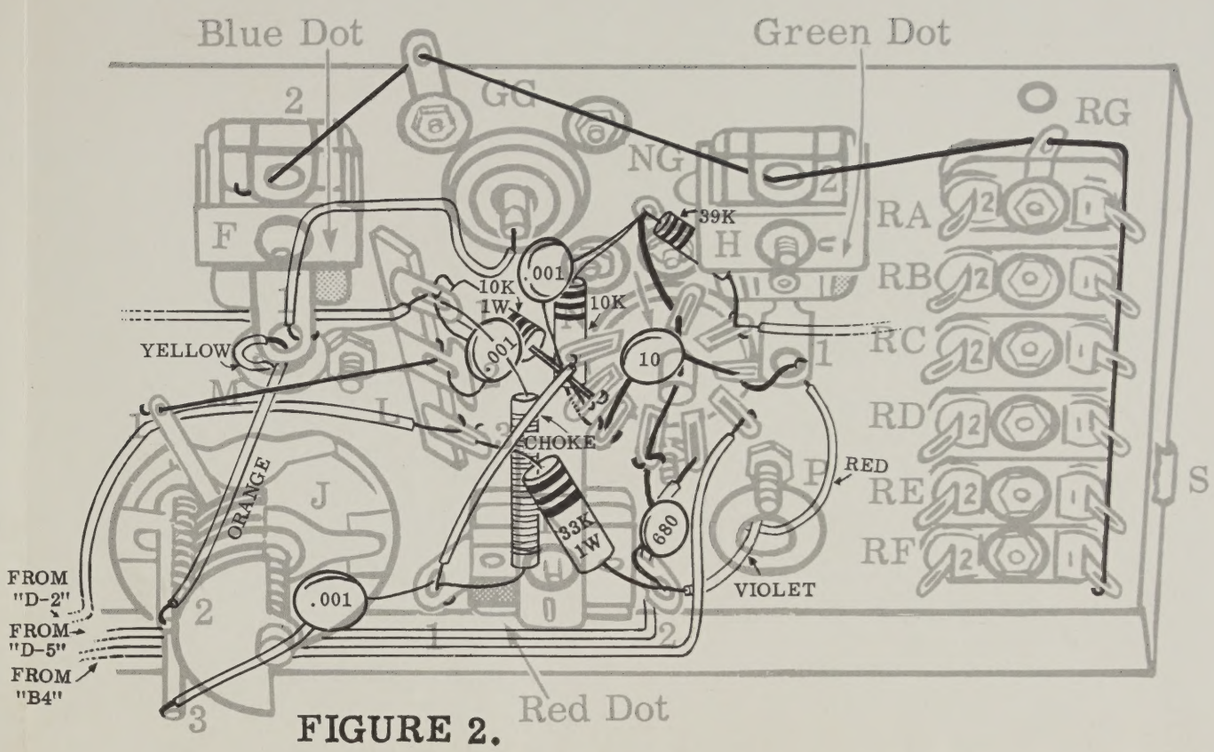


FIGURE 2.

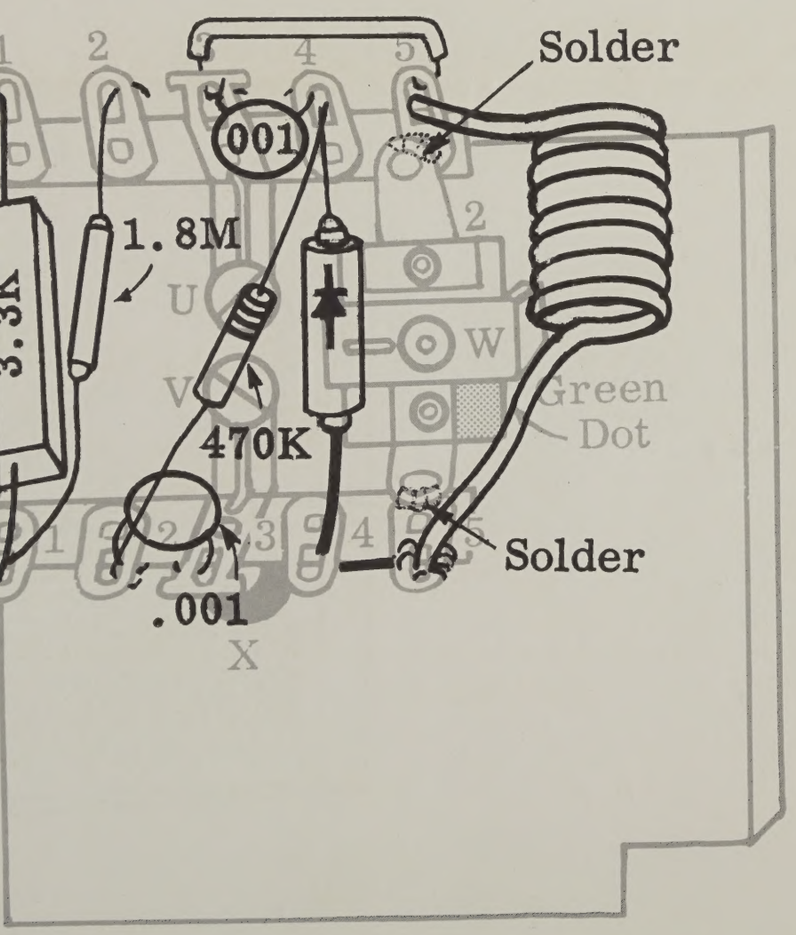


FIGURE 3.

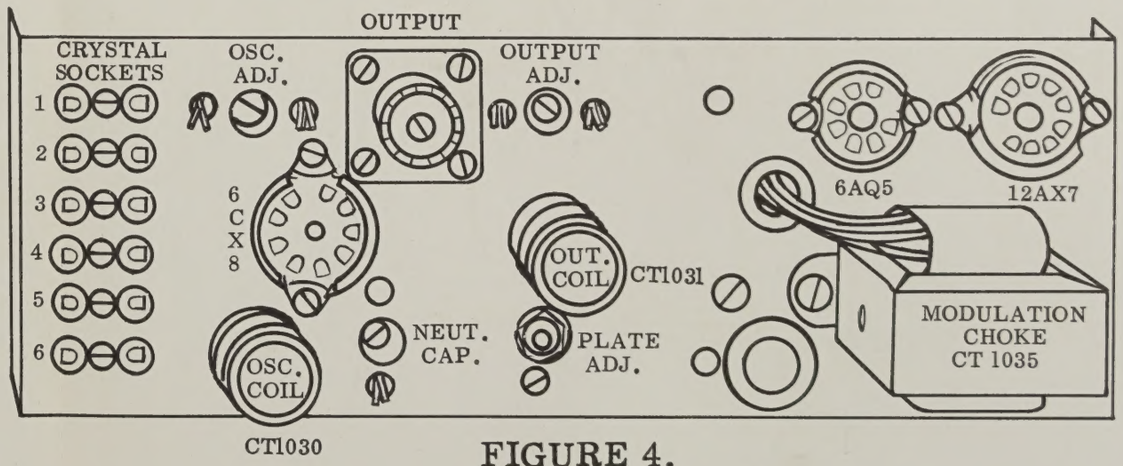
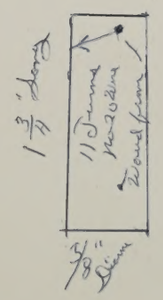


FIGURE 4.



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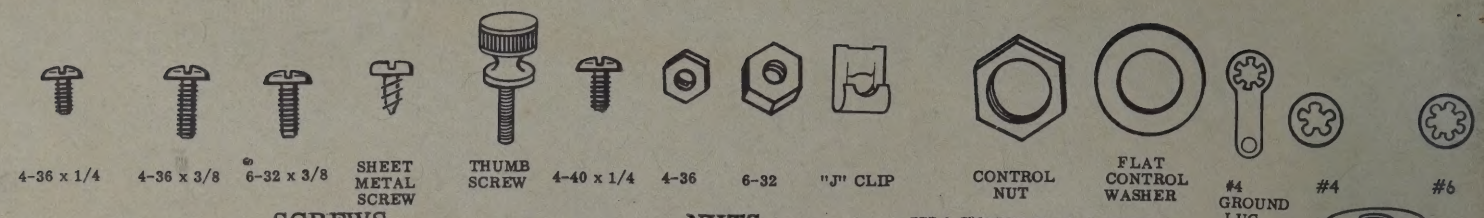
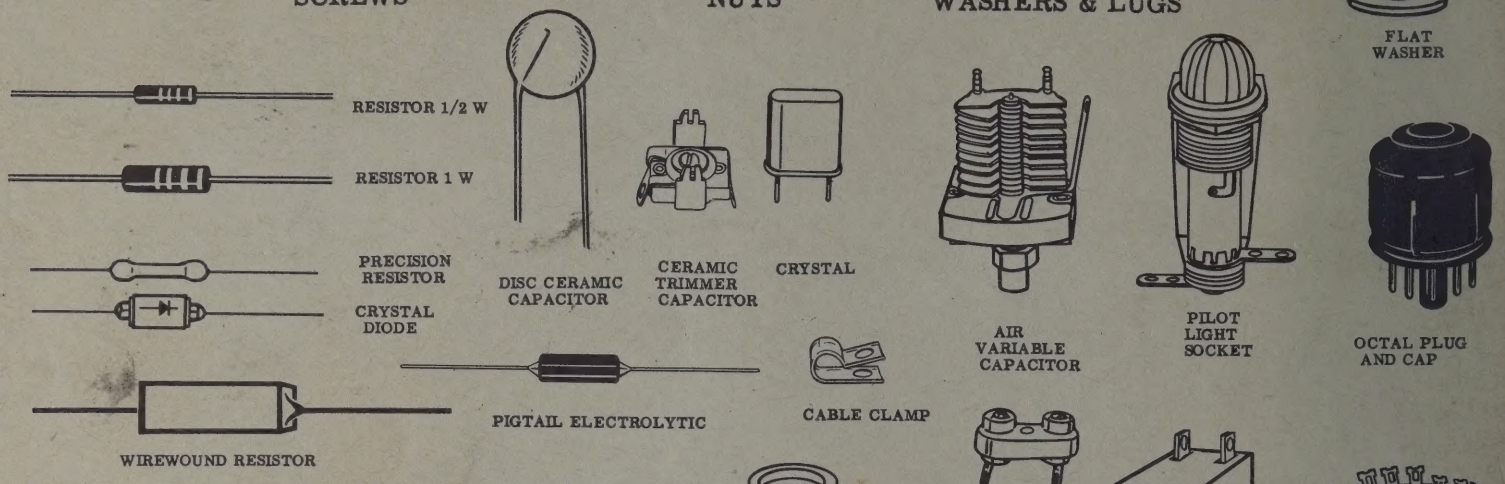
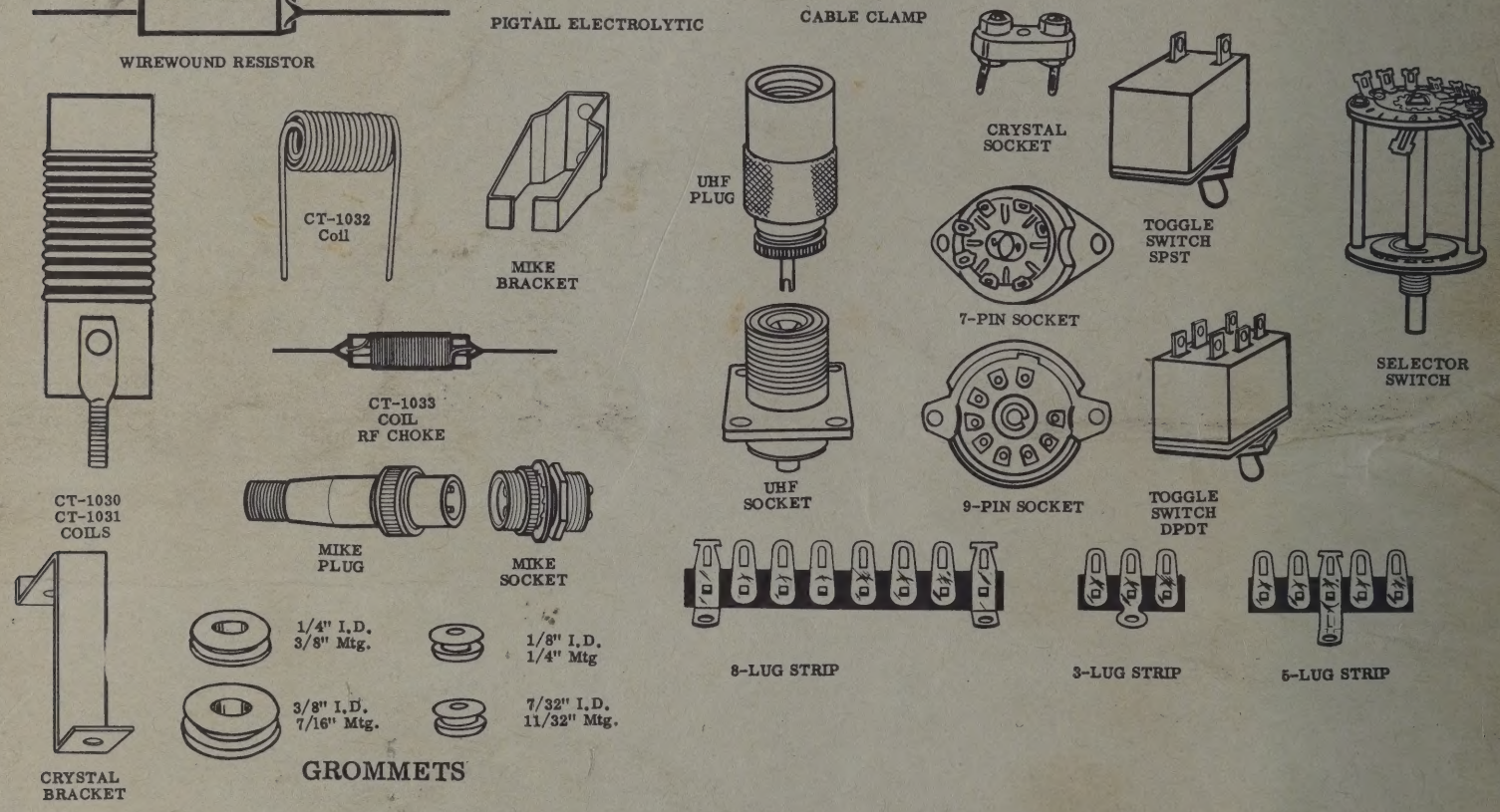


SCREWS NUTS WASHERS & LUGS

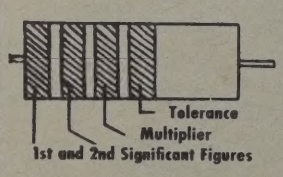




GROMMETS

STANDARD COLOR CODE — RESISTORS AND CAPACITORS

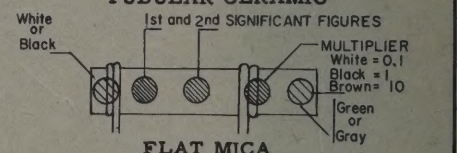
AXIAL LEAD RESISTOR



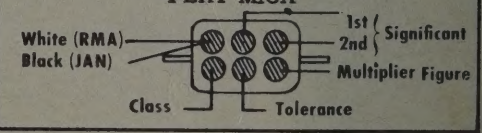
Color	First Figure	Second Figure	Multiplier
BLACK	0	0	None
BROWN	1	1	0
RED	2	2	00
ORANGE	3	3	,000
YELLOW	4	4	0,000
GREEN	5	5	00,000
BLUE	6	6	000,000
VIOLET	7	7	0,000,000
GRAY	8	8	00,000,000
WHITE	9	9	000,000,000

CAPACITORS

TUBULAR CERAMIC



FLAT MICA



PHILMORE MANUFACTURING CO., INC. • RICHMOND HILL 18, N. Y.